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CHASE

RADICAL CURE OF HERNIA BY INSTRUMENTS

James M. Smith

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# TREATISE

ON THE

## RADICAL CURE OF HERNIA

BY

### INSTRUMENTS;

EMBRACING AN ANALYSIS OF THE MECHANICAL PROPERTIES OF THE  
VARIOUS TRUSSES NOW IN USE, A DESCRIPTION OF THE  
NEW INSTRUMENTS INVENTED BY THE AUTHOR,

AND

GENERAL DIRECTIONS TO PATIENTS FOR THE SAFE EMPLOYMENT OF  
THESE INSTRUMENTS, WITH HINTS TO SURGEONS IN  
THEIR APPLICATION, ETC.

WITH NUMEROUS ILLUSTRATIONS.

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BY

**HEBER CHASE, M. D.**

HONORARY MEMBER OF THE PHILADELPHIA MEDICAL SOCIETY, ETC.

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TO  
REYNELL COATES, M. D.  
WILLIAM ASHMEAD, M. D.  
ISAAC PARRISH, M. D.

MEMBERS OF THE COMMITTEE OF THE PHILADELPHIA MEDICAL SOCIETY,  
APPOINTED TO INVESTIGATE THE SUBJECT OF THE  
RADICAL CURE OF HERNIA.

GENTLEMEN,

The constant and unwearied attention that you have been pleased to devote to the examination of the *modus operandi* of the several instruments which are recommended to public notice in the pages of this work, deserves every acknowledgment which it is in my power to make. After many months of severe and impartial scrutiny, you have expressed opinions highly flattering both to my personal feelings and to the claims of these instruments on the support and confidence of the profession.

These considerations, combined with the remembrance of the urbanity and friendly deportment which have distinguished you throughout the period of our intercourse, induce me to testify by this public dedication of the following pages to you, the high sense I must ever retain, of your devotion to the best interests of humanity, and your unvaried kindness to

Your most obedient,

Humble Servant,

THE AUTHOR.



## PREFACE.

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It is hardly necessary to apologize to the public for the appearance of the following treatise.—Those who have the misfortune to labour under hernia, will be prepared to read with interest any thing calculated to lessen the danger of their situation, or to relieve the constant anxiety of mind under which they labour from impending mischief, rendered so much the more appalling by being enveloped in mystery, or explained only in technical terms which they cannot understand. But, by the members of a Profession justly ranked among the liberal arts, and jealous of its honours, it may naturally be asked of one of their own number pursuing the unusual course of addressing the uninitiated upon the nature and mode of cure of a disease so important and difficult to be understood:—Why do you appeal on occult questions in surgery, to those who have no knowledge of anatomy? How can you safely intrust the management of a machine to those who know neither the nature of the moving power, the result to be accomplished, nor the several parts of the apparatus which nature has provided to effect the purpose?

The answer is a simple one, and will fully explain the purpose of this essay.

Much of the business of treating hernia by trusses, has gradually passed from professional hands into those of the patients themselves, or has been consigned to others who pretend to medical skill without having employed the means, by which alone such skill can be

acquired. Practitioners of the latter class have but too frequently no further purpose in view than the mere pecuniary result of the sale of their instruments; for they are not held in check by the necessity of maintaining unimpeached that most delicate of all possessions, a professional reputation; nor are they restrained like the patient, by the dread of personal suffering from their own ignorance or incompetency.

It is chiefly with the view of shielding the patient at once from those evils so frequently resulting from ill-grounded self-confidence on one hand, and from improper faith in the pretensions of empyrics and mere machinists on the other, that the following pages are offered to the world.

The Author feels more especially impelled to the execution of this task, by a sense of moral duty which teaches him, that in presenting to the afflicted a set of novel instruments of unusual power, and capable of effecting the radical cure, or the permanent security of rupture—a disease usually held incurable, except in a few rare cases, or after a severe surgical operation—he is bound to use his best endeavours to guard the patient against the dangers of their abuse and misapplication when employed by those who do not understand the nature of the disease or the action of the trusses.

In order to effect the purpose just mentioned, so much knowledge of the anatomy and pathology of hernia as may be absolutely necessary, will be given in the beginning of the work, and it will be rendered intelligible to the unprofessional reader by the avoidance of all unnecessary technicalities, and by illustrative figures. At the same time, due care will be taken not to enlarge upon subjects properly belonging to medical men, in such a manner as to betray the popular or empirical reader



into a mistaken dependence upon his own resources ; for nowhere is the danger of “a little knowledge” more apparent than in the practice of medicine and surgery.

Let it then be distinctly understood, that in the choice of a truss, and in its proper adaptation, the aid of a competent surgeon is indispensable. To prove this, and to show the nature and extent of the precautions which should be employed in the after-treatment, is the main design of that portion of the treatise which is addressed to the general reader.

One word to the members of the profession, and the Author will leave his labours to the judgment of the public and the tender mercies of criticism. It is well known, that not every one who claims the title of Doctor of Medicine has received a medical education, and also, that not all who are medically educated, possess the manual dexterity necessary to employ novel instruments with certainty and effect, without some preliminary notice of their peculiar purpose and *modus operandi*. Nothing more need be said as an excuse for the additional matter addressed to practising surgeons, consisting of some remarks upon the action of the various trusses, and the first adjustment of the instruments.

In justice I must acknowledge many useful pathological hints received from REYNELL COATES, M. D. during my investigations upon this branch of surgery. With this gentleman the profession are already fully acquainted through the medium of our public journals, and from his thorough knowledge of mechanics as applied to the principles of the science, they may yet look for important improvements in our *Materia Chirurgica*.

From various eminent surgeons of Philadelphia, whether attached to the several public hospitals, or engaged in private practice, I have received so many favours and

facilities while engaged in investigating the effects of various instruments, that it would be difficult for me to make them any acknowledgment answering to my feelings, and I must beg their acceptance of my warmest thanks as the only return in my power.

The wood-cuts illustrating the position of the various kinds of hernia, the parts of the various trusses in general use, and the drafts of the several instruments invented by myself, with the views of the mode of applying them, have been executed from drawings taken by MR. DRAYTON, from the apparatus itself, and from nature. It is hoped that they will be found as creditable to the art of wood-engraving as they are to the pencil of this able artist, whose anatomical knowledge renders his labours so valuable to the profession.

HEBER CHASE.

*Philadelphia—August, 1836.*

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## CHAPTER I.

### HERNIA, *or* RUPTURE.

HERNIA, or *Rupture*, words used in the same sense in common language, consists in the escape of some part of the intestine from the natural cavity into other neighbouring cavities, or into the intervening spaces between the fibres of the muscles and the tendons which enclose the abdomen. The intestine thus forced from its natural position, does not make its appearance externally, but remains covered by the skin, and often by several firmer membranes which lie beneath the skin, in certain parts of the body.

Every one who has attended carefully to the opening of a human body, or a quadruped, must have observed that the belly is surrounded on all sides, except in front, by strong *muscles* or flesh, some of which muscles terminate in broad, flat, and very strong white membranes or *tendons*, which complete the covering of the belly where the fleshy fibres are wanting in front. These membranes are in some places united into one; in others they are separated, and enclose some of the muscles between their folds. One great muscle, the *diaphragm* or midriff, shaped somewhat like a basin inverted, with its centre composed of tendon instead of flesh, separates the cavity of the belly from that of the chest. On the front of the abdomen, these muscles and tendons are covered, beneath the skin, by one broad sheet of thin but firm membrane, which is not connected directly with either of the muscles. At the lower part of the

belly they are also lined on the inside, with a similar membrane, giving additional security to the bowels.

This description will give a very tolerable idea of the structure of the walls of the abdomen. They are extremely thin directly in front, and also at the lower part of the belly, but in some places they are an inch or more in thickness. The cavity of the belly (so called) is entirely filled by the bowels, liver, stomach, kidneys, spleen, and other organs, over which is spread a thin, transparent, pearly membrane called the *peritoneum*, which not only envelopes the bowels and other organs, but dips between their folds, and in some places hangs loose from them like an apron. What is well known as the caul in animals, is formed by one of these aprons which hangs from the stomach, in front of the intestines, and then doubling upon itself, returns to attach itself to the great arch of the largest intestine.

The peritoneum connects the bowels to the spine in a very curious manner, which can be explained only to anatomists; and after covering all the organs, it passes in every direction to the inside of the walls of the abdomen, lining them completely. Thus constructed, it is compared to a loose bag without any opening or mouth, thrown, doubled and empty as it is, over the intestines, which adhere to, and infold themselves in one of its sides, while the other side is attached smoothly to the walls of the abdomen. But the two sides of the bag do not adhere together, and hence, most of the intestines, though tied as it were to the spine, slide about and perform all their necessary motions, carrying their peritoneal lining with them; thus the peritoneum is every where in contact with itself on the inside: it touches nothing else.

The walls of the abdomen are penetrated in many

places by blood-vessels and other organs, and are consequently rendered weaker in those places than elsewhere; but the peritoneum is a complete sac, and is penetrated by nothing, even where it lines the walls of the abdomen.

The muscles, of which so much has been said, and the tendons connected with them, keep up a continued pressure on the intestines by a kind of habitual contraction, and if at any time they are wounded to a considerable extent, the bowels are instantly forced out. But these muscles are continually called into violent action in coughing, laughing, lifting, jumping, &c., and they then produce enormous pressure on the bowels, which, of course, make great exertions to escape. If the pressure be so great that the walls of the abdomen cannot retain the bowels, some part of them force their way between the fibres, or through some natural opening; but instead of making their appearance externally, they remain covered by the skin, and also by the peritoneum lining the walls of the abdomen, which, having no orifices, is pushed out before them through the same passage by which they escape themselves. The bowels are still retained, as it were, within the cavity of the abdomen; but the dimensions of this cavity are enlarged by the thrusting of the lining membrane through an opening, either natural or accidental, in the proper boundaries of the cavity.

The portion of peritoneum thrust out in this manner, is called the *hernial sac*. The part of that sac which is embraced by the narrow opening through which it is forced, is styled *the neck of the sac*, which, of course, communicates freely with the general cavity of the peritoneum. When dropsy occurs in the abdomen, the

fluid penetrates freely into the sac, and disappears therefrom on the application of pressure.

The inconvenience resulting from this false position of a part of the bowels is very great. The dragging of the connexions between the intestine and spine, and the irritation of the bowel itself from the pressure of the narrow opening of the sac, produce a variety of symptoms of a nervous or dyspeptic character. These evils are relieved in most cases by the patient himself or his surgeon, who can generally return the misplaced bowel with care, by pressure, or *taxis*, as it is called, just in the same manner as the fluid in dropsy is returned into the abdomen. But, unfortunately, when the pressure is removed, the opening in the walls of the belly remaining, the bowel continues to descend into the sac upon slight or more severe exertion, and the action is thus renewed from time to time. Meanwhile the opening, being frequently distended by these descents of the bowel, becomes gradually larger and larger, and the escape of the intestine more and more easy. If no steps be taken to prevent the escape after the return of the bowel, or the reduction of the hernia, the situation of the patient soon becomes extremely distressing, and he is deprived of the power to enjoy exercise or follow his business. To retain the ruptured parts, and prevent their descent after reduction, numerous contrivances have been invented; of which by far the best, for all ordinary cases of hernia, are the instruments known under the name of *trusses*.

But very few ruptured persons wear their trusses continually both day and night; and although it might be tolerably safe to remove the instrument when in bed, yet even then, the effort to cough, or any other accidental exertion of the abdominal muscles, may cause the



bowel to portrude, and that, without the patient being aware of the fact; for it often happens that a hernia which is very obvious by day, retires by night of its own accord, in consequence of the relaxation of the muscles during sleep, and of the motions of the intestines in pressing forward their contents; which motions, under certain circumstances, may draw the misplaced bowel within the walls of the abdomen without further assistance. It is not to be supposed that the orifice through which the rupture takes place will ever be permitted to contract completely, *unless the bowel be prevented from descending at all for a very considerable length of time*; so that if a truss be intended to remedy the evils resulting from this accident, it should, in almost every case, be worn constantly.

But even if a truss of any common construction be applied in the proper manner, and worn without intermission, the patient is still insecure; for the pads of most of these instruments are made of soft and compressible materials, which after a time yield and become altered in shape to such an extent, that if they were originally well adapted to the particular case, they soon cease to be so, and the hernia but too frequently re-appears by the side of the pad. It is obvious, then, that firm materials are the best for effecting the necessary pressure over the orifice; but here we meet with other difficulties. To construct a block of wood, a pad of India rubber, or any other contrivance fitted to any particular form of hernia, requires not only considerable mechanical skill, but a thorough knowledge of the anatomy of hernia—which is one of the most difficult attainments of the surgeon. The consequence of these difficulties is, that in a great number of cases, the bowel continues to descend occasionally, and the patient, know-

ing that he is constantly in danger, cannot apply himself with confidence to any considerable exertion : or, if in some unguarded moment he venture to relax in his attention, the most terrible effects are sometimes produced. To prove that this is no idle picture, it is only necessary to state that a large majority of those who die of hernia or are subjected to severe surgical operations for its relief, are persons in the constant habit of wearing the trusses heretofore employed.

The author has no desire to insinuate that such consequences are not to be avoided by the proper use of some of these contrivances ; for it cannot be denied that many persons have been enabled to pursue laborious occupations by their aid ; and it is well known that, *occasionally*, cures are effected by them : but here, “the exceptions prove the rule,” and these happy results must be attributed either to accident, superior intelligence on the part of the patient, or unusual skill in the surgeon. Success from the first of these causes is too rare to be taken into the account. As regards the second, it is highly desirable that some knowledge of the nature of the disease should be more generally diffused among those who suffer, in order to increase the chances of their relief.

The third cause should be approached with proper delicacy : but it may be asked in perfect fairness, to whom is the choice and adaption of an instrument most usually entrusted ? Is it not to some surgeon’s instrument maker, whose slender knowledge serves rather to deceive than to direct him ? The patient frequently applies in the first instance to a medical practitioner, who may or may not be accustomed to surgical manipulation. The Doctor too often refers the case to the instrument maker, and instead of examining for himself how



far the truss is really adapted to the peculiar accident, he usually rests contented with the inquiry—"Does the truss retain the bowel?"—and if the answer be in the affirmative, the subject is at once dismissed from his mind.

This habit of trusting to the machinist on one hand, and to the judgment of the patient on the other, leads too many professional men into a neglect of that close observation so necessary to the proper understanding of the nature and condition of a rupture. It is a disagreeable task to point out the errors of our brethren; but the public good requires some notice of the fact that many patients present themselves to those whose surgical reputation is somewhat extensive, complaining of uneasiness which they do not understand, although they are provided with the best trusses in general use, applied by medical men, or by instrument-makers under their direction. These patients are but too frequently found to be affected with concealed hernia, which exists in consequence of the pad being made to act at an improper place. Indeed, there are very few trusses so constructed as to reach the seat of the origin of hernia in some forms of the complaint, and in others, none of these instruments will give permanent security: but these facts shall be spoken of hereafter. Sometimes indeed, cases present themselves in which a truss has long been used by the advice of a physician where no hernia exists; but these errors and their causes will be treated of in a separate chapter.

If, by the neglect or improper application of an instrument, the rupture be permitted to descend occasionally, or to remain down for a long time, the sac becomes gradually thickened, and the intestines are also irritated, until what is termed adhesive inflammation

comes on. The intestines are then very apt to become attached to the sac or to each other in such a manner that the contents of the sac can never be afterwards replaced within the walls of the abdomen, unless after a severe surgical operation. The hernia is then said to be *irreducible*, and of course, the case cannot be treated by trusses at all. There is another form of irreducible hernia in which the contents of the sac cannot be returned, because, being thickened by inflammation, they have become too large to repass the orifice which gave them exit.

The most dangerous of all the consequences of hernia is *strangulation*. This is caused by the neck of the sac after it has become very much thickened, or by the orifice in the walls of the abdomen through which the bowel escapes, pinching the intestine so strongly as nearly or quite to arrest the circulation, producing severe inflammation, or gangrene. Sometimes, instead of the bowel, it is a portion of the *omentum* or caul that forms the hernia, and in that case the strangulation even if not relieved, may, in a few rare instances, continue without producing death. Sometimes a small portion of one side of a bowel is caught in a narrow opening, and then mortification *may possibly take place* without destroying life.

But far more generally the whole diameter of one or more folds of the bowel is contained in the sac when strangulation takes place, and unless soon relieved from the pressure by operation or otherwise, the patient inevitably dies.

In all these several forms of hernia, the discharges from the bowels cease from the moment of strangulation, or very soon afterwards. In those cases in which the whole diameter of the bowel is strictured, the reason

of this is obvious, because the tube is closed and the contents cannot pass ; but the cause of this binding of the bowels when the tube is only partly included, or when nothing but the omentum is strictured, can only be understood by medical men. It ought to be mentioned, however, that even in the worst cases, two or three small discharges sometimes take place almost immediately after strangulation, but they come from the lower part of the canal, only, and when that is once emptied, no more can follow.

These remarks, though perhaps useful for their own sake, are introduced here to open the way to an explanation of the danger of misapplying trusses, and the necessity of improvement in the general form of these instruments.

A fatal strangulation of a portion of bowel may take place when its escape can scarcely be perceived externally even by practised surgeons, and the swelling which is usually created by the rupture, is often mistaken by those who are not of the profession, for other diseases.

It often happens, then, that trusses are applied when a portion of the intestine remains in the sac ; and the instrument occasions much obstruction, inflammation, or even strangulation, by its pressure on this portion. These slight protrusions are neglected in some cases until fatal strangulation occurs, under the impression that the disease is a bubo, a swelled gland, or mere bile.

But there is still another cause of disaster produced by the neglect of a proper study of hernia, which occurs occasionally in the hands of medical men of no mean standing. In one of the forms of this disease, the bowel, after passing through the narrow opening in the inner part of the walls of the abdomen, courses for an

inch and a half or more along a narrow canal within their thickness, where it can seldom make much show; and it then makes its way, by another opening, through the rest of the thickness of the walls, and causes considerable swelling beneath the skin. To the eye of those who know little of surgery, the rupture appears to commence at this second opening, and what is worse, almost all the trusses commonly in use are formed to press principally upon this spot, while the upper opening is only lightly protected or not covered at all. From this cause it has sometimes happened that, while a truss was in use and appeared to retain the bowel perfectly, a small portion has crept unperceived through the upper orifice into the canal, and there, concealed by the pad, it has become strangulated; the symptoms have been mistaken for colic, and the patient has died.

In another common form of rupture, the spot at which the stricture generally takes place in strangulation is so covered that no ordinary pad or compress can be made to act directly upon it; and although the common trusses may prevent the descent of the intestine to a sufficient distance for becoming strangulated, they do not allow the powers of nature to close the original opening, as happens in some cases of hernia in other situations.

It cannot certainly be necessary to add any further proof of the folly of entrusting the adaptation of trusses to the ignorant, or to point out the necessity of improvement in the formation of these instruments.

In the above remarks, there has been no reference to the existence of ruptures in which trusses cannot be applied; but it may be well to mention that cases of this kind do occur, though they are comparatively rare. As the protrusion of the bowel may take place at any part



of the walls of the abdomen, it may be seated where no other application than a bandage or compress can be made to act;—as when it occurs above the navel, or on one side, above the sharebone or *pelvis*; or it may take place through the midriff into the chest, where no surgical aid can avail for its removal. Sometimes, indeed, a fold of intestine forces its way through a wound in the omentum, or in the double fold of the peritoneum which ties the intestines to the spine; and cases have occurred in which false membranes resulting from inflammation in the abdomen have involved the intestine in such a manner as to produce a stricture; and all the consequences of strangulated hernia may follow. But these cases just spoken of, are very rare, and hardly worthy of notice in a popular work; for when they do occur, none but surgeons of the highest skill can be of any use to the patient, and even such can do but very little.

It is also unnecessary to mention here several other varieties of hernia, some peculiar to the female, and others common to both sexes, which admit of partial relief from the use of instruments of a character totally different from trusses; for these require even a more profound knowledge of anatomy and mechanics. The very existence of such cases is probably unknown to most of the professed truss-makers, and truss-venders; and it is very doubtful whether the interests of humanity would be promoted by making them more generally known among those whose temerity often exceeds their knowledge of the structure of the human body.

Fortunately it may be safely estimated, that not above one in a thousand cases of rupture requires the use of any other apparatus than a proper truss—unless, from

neglect on the part of the patient or his attendant, the hernia has become irreducible.

The several forms of rupture requiring trusses, and which are therefore treated of in this work, are as follows:—



## SECTION 1.

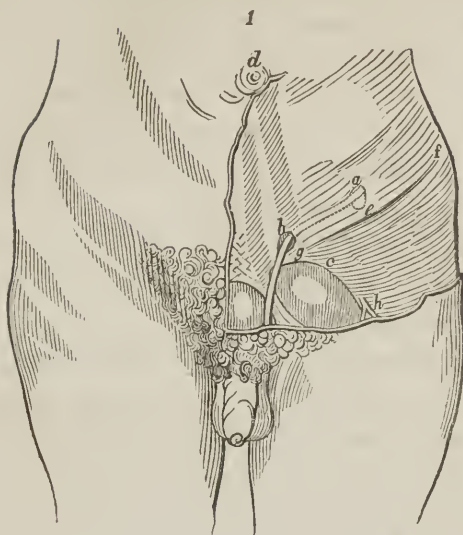
### ON INGUINAL HERNIA.

In this form of the disease, the bowel passes from the abdomen through an opening called the *internal ring*, (fig. 1, *a*.) about one inch above the middle of the fold of the groin, and four inches outwards, from the middle line of the body.\* The bowel then travels downwards and inwards, about an inch and a half, or two inches, through a narrow canal in the walls of the abdomen, intended to accommodate the spermatic cord as it passes to the testicle in men, and for the round ligament of the uterus in women. It is seen in fig. 1, marked by the dotted lines connecting the two rings. It then passes outwards, through the remaining thickness of the walls, by another orifice called the *external ring*, (fig. 1, *b*.) which is situated immediately above the inner side of the groin, an inch and a half, or two inches outwards, from the middle line of the body. The upper of these rings is easily closed by pressure on the skin immediately over it; but the lower one is secured with some difficulty, because it lies close above the bone, and pressure upon the hard edge of the latter is extremely uncomfortable.

\* This description is intended only for unprofessional readers.



FIG. 1.—ANATOMICAL VIEW.



The skin and superficial fascia removed from the left side of the abdomen, and the left groin, so as to display the surface of the tendons, the position of the abdominal rings, and canal, &c.

- a* The internal abdominal ring, marked in dots, as seen through the tendon of the external oblique muscle.
- b* The external ring, formed by a natural separation of the fibres of the same tendon; the spermatic cord seen passing through it to the scrotum, and the dotted line between the two rings marking its course upwards, under the tendon, through the abdominal canal.
- c* The spot where the tumor in femoral hernia is generally seen when it rises from beneath the fascia lata of the thigh, the femoral canal not being visible in this view, because it is hidden by Poupart's ligament.
- d* The umbilicus.
- e* The middle of Poupart's ligament.
- f* The anterior, superior spinous process of the os ilium.
- g* The body of the os pubis, forming the lower boundary of the external ring.
- h* The saphena vein passing through the fascia to join the great femoral vein.

Sometimes the bowel, instead of passing through the internal ring, bursts into the canal somewhat below that point, and sometimes it escapes directly from the belly through the external ring. In the latter case it is called *Ventro-inguinal Hernia*,—which is a variety of the inguinal species requiring a peculiar truss for its safe retention, and differing widely from any one now in general use.

In common inguinal hernia of long standing, the rings are often greatly enlarged, and the internal is drawn down until it overlaps or corresponds with a part of the external ring. The bowel then passes out almost directly from the abdomen, and after the reduction, the finger can depress the skin of the part into the cavity of the belly through the upper portion of the aperture. This form of the disease is called *Direct Inguinal Hernia*, and generally requires the same truss as the ventro-inguinal variety.

When, in common inguinal hernia, the bowel passes the internal ring, but does not extend far enough to reach the end of the canal, it makes little show, and is often detected with difficulty. It is then called *Concealed Inguinal Hernia*. This is the form of rupture that sometimes continues and becomes strangulated while the patient is actually using one of the common trusses.

When, in any form of inguinal hernia, the bowel passes far beyond the external ring, it necessarily drops into the scrotum, and it is then called *Scrotal Hernia*; but this circumstance does not change its nature in the least, nor does it require any peculiar modification of the truss.

There is yet another form of inguinal hernia, called

*Congenital-Inguinal Hernia*, because the patient is born with it ;—but as it requires no peculiar treatment unless strangulated, it need not be described at present.

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## SECTION 2.

### ON FEMORAL HERNIA.

In this form of disease, the bowel escapes through a passage made for the great blood-vessels of the thigh to pass from the body to the lower extremity.

The tumour is situated in the fold of the groin, near the inner side of the limb, and is usually very small. Sometimes, however, it becomes larger in old cases. The site of the tumour is seen at *c*; fig. 1 ; but the passage which gives exit to the bowel cannot be brought into view by any figure intelligible to the general reader.

Men, and unmarried women are said to be very seldom affected with femoral hernia, but I have met with it so frequently in both, that I am inclined to think this impression erroneous. In married women it is the most common form of the disease.

In men, the difference between femoral and inguinal hernia is obvious ; but in women it is very often extremely difficult to determine the nature of the case, because, in them, the different passages through which the intestine escapes, are so very near together and so thickly covered by adipose matter.

The orifice in femoral hernia is called by English surgeons *the femoral ring* ; but in fact, it is a short

canal, and not a mere ring ; so that strangulation may occur either at its commencement or at its termination. It is, however, impossible to describe the form or nature of this canal to any but thorough anatomists, and it is only necessary to mention here, that the distance between the two extremities of the passage is too short to permit of a concealed hernia, such as sometimes occurs between the abdominal rings.

There are several forms of femoral hernia, but they need no particular description in a popular work, for they are precisely alike in external appearance, and require no peculiar mode of reduction or measures for retention. They are all more liable to strangulation than the other forms of hernia ; and when this accident takes place, a fatal change of structure occurs more speedily, because the femoral is much smaller than the abdominal ring. Femoral hernia often escapes the observation of the patient for some time, in consequence of its small size, and in recent cases it is frequently mistaken for a small gland.

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### SECTION 3.

#### UMBILICAL HERNIA.

In umbilical hernia, the bowel escapes at the navel. (Fig. 1, *d*.)

The walls of the abdomen at this spot are rendered somewhat weak in many cases from the following cause. Before the child is born, two import-

ant blood-vessels pass from the body of the infant to the after-birth, and another much larger one returns the blood from the after-birth to the child. These vessels, twisted upon each other, and bound together by a firm mass of peculiar formation, constitute the umbilical cord, which is attached at the navel, and the blood-vessels continue their course to the liver through a pretty large opening in the walls of the abdomen. After the child is born, this cord being tied and cut off by the midwife, these vessels slowly disappear; the stump of the cord contracts and falls off, and the opening in the walls of the abdomen heals. The cicatrix, or scar, from this healing, constitutes the navel: but as the process is often imperfectly accomplished, the part remains weak, and the same causes which produce hernia in other places, sometimes, in early life, occasion a protrusion of the bowel in this situation.

The most frequent cause of umbilical hernia in adults is pregnancy. The distention of the abdomen during gestation tends to separate the fibres of the tendons on the front of the belly, and renders any feeble point still weaker; hence, umbilical hernia is frequently met with in married women.

Children are also liable to another variety of this complaint which is often incurable. In the fœtus, while the body is forming, it appears that the abdomen is at first open in front, and is gradually closed by the growth of the walls of the cavity from each side towards the middle line, where they finally unite: but it sometimes happens that the skin unites while the tendons of the muscles rest in an imperfect condition and allow the bowel to pass through an inter-



val on the middle line. Such cases are extremely rare, and cannot be kept reduced without very great difficulty : the worst cases of this nature are altogether incurable.

Besides the species or varieties above noticed, there are many other forms of external rupture, called *Ventral Hernia*, which may occur at any point in the walls of the abdomen, more or less distant from that above specified. Some of these admit of the application of trusses ; others do not ; but, as the form of the instrument employed must be adapted to each case, it is impossible to lay down general rules upon that subject, or to keep on hand the necessary apparatus. The invention of the surgeon is called into play whenever such ruptures occur, and it is therefore useless to dwell upon them in a work designed for the popular reader.

Several herniæ often occur in the same patient. When two ruptures are found on opposite sides of the body, the patient is said to labour under *Double Hernia*.

Femoral or inguinal rupture may occur on both sides at once ; or the rupture may be femoral on one side and inguinal on the other ;—or, again, these two forms of the complaint may be present on the same side at the same time ; and either of these compound cases may or may not be complicated with umbilical hernia. Unusual accidents of this kind often demand the employment of double trusses, and pads or blocks of peculiar forms.



## CHAPTER II.

### SYMPTOMS OF HERNIA NOT STRANGULATED.

THE first occurrence of hernia is often marked by distinct symptoms which may point out to the patient the nature and location of the accident. When the protrusion occurs suddenly and during any considerable exertion, there is usually a sense of giving way or tearing at some part of the surface of the belly, followed immediately by more or less swelling of the part, and often a redness of the skin; but, when it takes place gradually, it is only preceded by a feeling of weakness and fulness at a particular spot, often escaping attention for some time, and not attended by any redness. Occasional instances are also observed in which a rupture has existed for a long time without the knowledge of the patient.

In sudden cases not attended with symptoms of strangulation, the tumour may be readily distinguished from a swelled gland, a bubo, or any other kind of inflammatory disease, by the following marks. In a hernia, the swelling reaches a considerable size at once, and does not increase by slow degrees like an inflammation; afterwards its increase is gradually very slow unless imprudent exertion on the part of the patient should force out an additional portion of the bowel.

If the hernial sac contain nothing but omentum, the tumour has a peculiar doughy or pasty feeling from the first, and if inflammation comes on, it is rendered harder instead of softer for a time; but, in swelled glands or

any other inflammatory enlargements, the tumour is hard at first, and, if it ever softens, the change takes place after several days have elapsed; and the impression on the finger in examining the part is very different from that of an omental rupture; the pastiness, if present at all, being confined to the edge of the swelling, while the centre is much softer and somewhat elastic. The change in the colour of the skin, in such recent ruptures, is diffused over the whole tumour, but, in inflammatory swellings, it soon becomes more strongly marked at the centre.

When the sac contains a portion of bowel without omentum, the swelling is more or less elastic from the first, and seldom becomes very hard unless strangulation be produced.

But the strongest of all the marks of recent rupture, in a great majority of cases, is the ease with which the tumour is made to disappear by the application of methodical pressure, and the constant tendency to a return of the swelling when the pressure is removed or when the patient uses strong exertion. If the hernia cannot be reduced by moderate pressure, there is always great danger of strangulation in recent cases. The best mode of applying pressure will be given in another chapter.

When a rupture has been neglected or treated with a bad truss, the general health of the patient begins to suffer, and his usefulness and comfort are completely destroyed. The frequent changes in the position of the bowel are very apt to occasion a sensation of weight and dragging within the belly, a pain and heaviness about the loins, sometimes (if the hernia be large) a difficulty of breathing, various nervous disorders, more or less irritation of the bowels, slight and diffused sore-

ness of the abdomen, and, in a few instances, cramp in the extremities.

These disorders cannot continue long without producing a derangement of the stomach, and then all the various symptoms of dyspepsia are added to the list ; the liver, the heart, and the brain sympathizing with the stomach. In bad cases we sometimes observe great costiveness, sallow complexion, palpitation of the heart, and obstinate headach or dullness of mind resulting entirely from hernia ; and when no other disorder exists, it is astonishing how quickly all these symptoms disappear after the application of a well-adapted truss. But I have frequently seen the symptoms continued under common trusses *which appear to retain the bowel* though they did not completely accomplish their purpose ; hence the great necessity of care in the construction, and skill in the application of instruments.

Far more serious consequences than any that have yet been noticed result from strangulation, the meaning of which term has already been defined.

Strangulation may be either partial or complete : that is, the circulation in the protruded intestine may be either embarrassed, or entirely arrested, according to the lightness of the stricture at the neck of the sac. When the stricture is partial, the intestine swells and inflames ;—when complete, the intestine mortifies. Even in partial strangulation, the swelling resulting from the inflammation very often renders the stricture complete in a few hours ; so that mortification is the usual termination of strangulated hernia, unless the patient be relieved by the reduction of the tumour by a surgical operation. But life

is sometimes destroyed in consequence of the irritation of the bowels or peritoneum before the case has progressed so far. In a few rare instances, the powers of nature accomplish a cure, after mortification, by establishing an artificial anus, if the contents of the sac are composed of bowel ; or by an abscess, if the protruded parts are entirely omental.

In hernia composed partly or entirely of protruded bowel, the symptoms of strangulation are generally as follows : There is more or less pain at the neck of the sac, soon extending to the whole tumour ;—the patient is unable to reduce the intestine by the ordinary means ;—one or more discharges from the lower part of the bowels often take place immediately after the accident, and then they become completely bound until the termination of the case. But these discharges after strangulation are generally considered of rare occurrence. If not soon relieved, the irritation of the sac and its contents commonly extends to the cavity of the abdomen and produces extreme soreness to the touch ; the bowels generally swell and become filled with gas ; violent pains resembling cholic, and very often mistaken for it, come on early and continue increasing ; the tenderness of the tumour becomes more and more distressing, severe vomiting supervenes, and the stomach is rendered incapable of retaining either food or medicine. The belly at length swells till it resembles a drum ; the patient is troubled with chilliness and great debility, and has a haggard and sodden countenance, which indicates extreme danger. If the case be allowed to go on without relief, the contents of the bowels often begin to be vomited up ; and this is

usually regarded as a mortal symptom, although some cases of recovery have occurred by operation, even later in the progress of the case.

When a considerable portion of bowel is mortified in consequence of strangulation, the moment at which the mortification takes place is commonly, but not invariably, marked by a cessation of all the more severe symptoms, and the friends of the patient are very apt to congratulate themselves on the prospect of a speedy cure, while the surgeon, judging from the small fluttering pulse, or its total absence, concludes that a few hours will terminate the life of the sufferer.

To show the propriety of upholding some hope to the last in this disease, it is proper to remark that mortification of the bowel is not always fatal when the case falls into the hands of an accomplished surgeon. Sometimes the mortification is confined to small spots, and these may be tied up during an operation, so as to hinder the escape of fæces when the bowel is returned into the belly—a plan recommended and practised by SIR ASTLEY COOPER, the most distinguished of the English surgeons. Even if the mortification include the whole circumference of the bowel, the patient may recover with what is called an artificial anus. This terrible and disgusting result of hernia occurs in the following manner.

When the surgeon, in operating, lays bare the protruded bowel, and finds it extensively mortified, he first relieves the stricture by cutting some of the tendinous fibres which surrounded the neck of the sac ; and as it would certainly be fatal to return the dead



portion within the belly, he cuts it open so as to allow of a free discharge of the fœces at the wound.

The living portions of the bowel remain side by side in the neck of the sac, to which they adhere firmly, and close the cavity of the abdomen, and in this way the wound heals, leaving both ends of the gut open. The lower portion of the bowel is then no longer of any use, and the life of the patient depends upon the digestion going on in the stomach and the upper portion. If the part of the bowel involved in the rupture happen to be low down towards the extremity of the canal, the patient receives sufficient nourishment from rich food, and lives ; though life under such circumstances, is hardly worth possessing. If, on the contrary, the opening be high up, towards the commencement of the small intestine, there is too little space above the artificial anus to allow the proper changes to take place in the food, or to admit of the absorption of sufficient nourishment for the supply of the blood, and the patient dies by a kind of slow starvation, which would be perfect torture, if it were not possible to relieve the craving of the stomach by food.

The world owes to **DOCTOR PHYSICK**, the invention and successful application of a plan by which some cases of artificial anus may be cured, and the patient restored to the enjoyment of life, by a second operation. Another method, founded upon the same principle, was afterwards employed by the equally celebrated **DUPUYTREN**. Recently, and for the second time in this country, a case has been successfully treated by **DOCTOR LOTZ**, a surgeon in the interior of



this State, who has not yet made public either the case or the novel instrument employed by him, which is considered, by high surgical authority here, to be an important addition to our means of treatment.\*

But it would be wrong for the reader to suppose, because several of the greatest surgeons of the age have each contributed to our means of saving human life in the most desperate cases of strangulated hernia, that this accident is always manageable, or that the surgeon is blameable who loses a considerable number of patients even under more favourable circumstances.

Strangulation always endangers life, and it is not always the firmest stricture that most speedily destroys the patient. When the contents of the sac and the sac itself have once fairly taken on inflammation, that inflammation is liable to become extended to the whole peritoneum, or if the altered bowel be returned by reduction, its mere presence in the cavity in its unhealthy condition may become a source of similar mischief; and peritoneal inflammation, even when it occurs without any other disease, is a very fatal complaint.

It is a rule with all operators that when the bowels are not found in a state of mortification they should be returned into the belly, because this practice promises the best chance of cure, but the patient may die after the most guarded treatment in such cases, either from the disease just mentioned or from the mortification coming on after the reduction. Several other fatal accidents may also occur to disappoint us in the most promising cases, but these cannot be explained in a popu-

\* I am informed that a paper upon this case, from the pen of Dr. R. Coates, will appear in the *American Journal of Medical Sciences* in August next.

lar work, for they are only intelligible to professional men.

The symptoms of strangulation, when the sac contains nothing but omentum, are often milder than those already pointed out, and the chances of recovery without assistance are a little better. In cases of this kind, it seems as if the firmer the stricture, the less the danger; for if the neck of the sac be wide enough to allow the circulation in the protruded omentum to be continued, the part inflames and the inflammation is very apt to extend itself to the belly: but should the circulation be completely arrested, the part dies almost immediately, and it may then form an abscess and be discharged externally; in which case the rupture is radically cured. These instances, however, happen so rarely that they hardly deserve to be taken into account in the ordinary calculation of chances. As a general rule, the strangulation must be speedily relieved by surgical measures, or the patient must die.

The instances of complete strangulation occurring suddenly are somewhat rare. In inguinal hernia, the case may run on for many days, before mortification or any other fatal accident takes place, though it becomes very dangerous when it continues more than twenty-four hours. In femoral hernia, half that time is sometimes sufficient to determine life or death.

In the foregoing observations I have confined my attention to the consideration of reducible hernia, leaving a few remarks on irreducible ruptures for future notice.

## CHAPTER III.

### ON THE REDUCTION OF HERNIA.

MANY persons labouring under rupture, acquire such skill in reducing it, that they succeed better under ordinary circumstances than the surgeon himself; but this is the result of long habit, and, in a popular essay like the present, it seems necessary to give some general directions as to the mode of treating recent cases.

The term *Taxis* is applied to the mode of reducing a hernia by methodical pressure, which is generally accomplished either by the hands of the patient, or by those of the surgeon; and, in difficult cases, the measure is rendered more successful by certain collateral proceedings which will be presently noticed. Unfortunately the word *taxis* has been received in a perverted sense by many writers;—it has been associated with the idea of violent pressure; and hence, in several of the most important treatises on hernia, this plan of treatment has been strongly condemned in terms calculated to confuse the ideas of an unprofessional reader who is not aware that the abuse and misapplication of the measure are substituted in these works for the measure itself. To condemn the reduction of hernia by *taxis* is absurd; for every time that the protruded bowel is returned into the abdomen by the patient himself, this operation is performed. Violent efforts really deserve the censure cast upon them, but the operation requires no violence. These remarks being premised, we may proceed to lay down the rules which should govern the patient in his attempts at reduction.

The moment a protrusion of the intestine is perceived, the patient should endeavour to return it by gentle pressure with a few fingers, if the tumour be small,—or with one or both hands, if it be large.

This pressure should not be constant and uniform in its direction in all cases; for the alternate pressure of the different fingers, and slight changes in the direction of the force, facilitate the return of successive portions of the bowel by stimulating it to action and causing it to discharge its contents so as greatly to lessen the difficulty of reduction. It must be kept constantly in view, however, that the force applied should always be directed towards the neck of the sac, and that in reducing the last portions of the intestine, it should correspond with the precise route by which the protrusion takes place; hence each form of hernia requires some peculiar manœuvres which will be described in the proper place.

If the bowel return with perfect ease on very slight pressure, the taxis may be applied while the patient is standing with the body inclined forward; but if any difficulty be experienced, every advantage of position which can in any degree favour the reduction should be taken without delay. The patient should place himself on his back in bed, with his shoulders considerably raised and his hips slightly elevated by pillows. His knees should be drawn up, and if the rupture be seated in or near the groin, the thigh on the same side with the injury should be flexed rather more than the other, across which it should then be carried slightly toward the opposite side.

The taxis may now be gently renewed under the most favourable auspices, for, in this attitude, the walls of the abdomen, and especially those fibres that surround the

neck of the sac, are placed in the most perfect possible state of relaxation. If, however, the patient should still experience difficulty, and cannot reduce the hernia by gentle means in twenty minutes or half an hour, it will be high time for him to send for his surgeon, as every hour's delay *may be attended* with very serious danger to life.

If, on the contrary, the taxis be successful, one of the two following courses should be pursued: If the patient has a truss, and is accustomed to its application, he should immediately resort to it, in order to prevent a return of the protrusion; if not, he should, when able to do so, remain in bed, avoiding all attempts at exertion until he has taken surgical advice, and has received a suitable instrument for his safety. It is true that, should he *go* in search of advice instead of *sending for it*, and the protrusion should re-appear, it is usually reduced again with great ease by the surgeon at the time of applying the truss; but as the protrusion in all herniæ, and more especially in those that are recent and small, is attended with *some danger*, it is right to avoid the accident as much as possible.

Here I would willingly pause, and in accordance with the principles laid down in the Preface, omit all notice of the collateral means by which the reduction may be facilitated in obstinate and strangulated cases; for the use of such measures requires superior judgment, and ought always to be left in professional hands, whenever such assistance can be obtained. But as every hour lost in commencing the active treatment of a strangulated rupture is attended with serious danger to life, and as many patients reside, and all are liable to be placed, occasionally, at a distance from any practitioner



of surgery, common humanity demands some notice of the safest of these means in this place.

As soon as there is reason to believe that strangulation is about to occur, cold ice water may be applied to the tumour; for cold brings on a strong contraction of the external parts, while at the same time, it retards or diminishes the flow of fluids toward the strangulated intestine, and often produces an increased action of the bowel, assisting it to expel its contents, and thus diminishing the bulk of the parts to be restored.

In hale and vigorous persons it is sometimes proper to bleed with some freedom, especially when the tumour or the abdomen becomes very painful to the touch. If the hernia be omental, the case protracted, and the tumour inflamed, it is often right to apply leaches to the parts about the neck of the sac. By these measures we still farther diminish the flow of blood toward the tumour; we increase the relaxation of the walls of the abdomen and the fibres which form the stricture; and we lessen the danger of rapid inflammation or gangrene. In large hernia, reduction has sometimes been effected by the steady pressure of some heavy body upon the tumour for several hours in succession, when all attempts at more rapid action have failed. One or more common smoothing irons will answer the purpose very well, when properly supported on the tumour.

While these measures are employed, it is right for the patient, from time to time, to make moderate efforts at the taxis, and the attitude already directed should be steadily preserved.

Many other means are occasionally employed by surgeons in the reduction of strangulated hernia; such as common injections, purgatives, emollient applica-

tions, the warm bath, opiates, narcotic poultices, tobacco injections, &c. ; but these should never be resorted to, without the special order of a professional man ; for none of them are *generally* applicable, and, when misapplied, they are highly dangerous.

I will now proceed to notice the direction that should be given to the taxis in the several different forms of rupture ; and it should be remembered, that though the patient be generally lying down, the terms upwards, backwards, &c., used in the description, all refer to the recumbent position.

In inguinal hernia, when small, but not concealed, the intestine should be pressed backwards, and a little upwards and outwards, until it enters entirely within the abdominal canal. (See fig. 1, p. 13.) After this, it should be pressed outwards and a little upwards along the track of the canal, which always tends towards the spine of the sharebone. (Fig. 1, *f*.)

When the hernia is large, and particularly when it descends into the scrotum, one hand should be placed beneath the tumour to elevate it directly upwards, making general pressure at the same time, while the fingers of the other hand are engaged in attempting to urge towards the canal the part of the intestine which lies next the ring. In the mean time it is often very useful, occasionally to press the index finger over the upper part of the external ring, and then to slide it gradually outwards and upwards toward the internal ring, in order to return within the abdomen the last portion of the intestine which lies in the canal.

When the first part of the reduction is accomplished, or, in other words, when the whole of the protruded intestine is reduced within the abdominal canal, the finger of one hand should be placed over the external ring

so as to close it, while with two fingers of the other hand, the last portions of the contents of the sac are fairly pushed through the internal ring.

In concealed inguinal hernia, it is the last part of the operation, and in ventro-ingual, the first part only, that is required ; for in the former, the protrusion is never carried beyond the canal, and in the latter, the intestine does not enter the canal at all.

There is very little difficulty in distinguishing between a common inguinal, and a ventro-ingual hernia, when any attention has been paid to the situation of the two rings and the canal. In the former variety of the disease, when the intestine is down, there is always an unusual fulness about the internal ring and the route of the canal ; while, in the latter, this fulness is never present. When the protruded parts have been reduced, and any strong effort, such as coughing, is made by the patient, the disposition of the intestine to escape is first felt by the finger placed at the internal ring, in inguinal, and at the external ring, in ventro-ingual hernia. Pressure on the internal ring, in the former variety, prevents the protrusion ; and in the latter, it does not. Pressure on the external ring prevents the formation of any considerable tumour in a large majority of cases of both varieties, but it does not prevent the fulness about the canal in common inguinal hernia.

Sometimes, indeed, the abdominal canal itself becomes dilated by hernia to an enormous extent, and then one may see a very large tumour produced, which does not extend to the external ring ; but cases of this kind are exceedingly rare. If some of the instruments recently contrived for the radical cure of hernia, but which act almost exclusively on the external ring, should succeed in closing that aperture permanently,

while the canal remains open, I think it very probable that the number of such cases will be increased hereafter.

In femoral hernia, the bowel, after passing downwards for a short distance, through the femoral ring or canal, comes forwards, and a little inwards, through a vacancy in the tendinous membranes or fasciæ of the thigh, (fig. 1, c, p. 13,) and then first forms a visible external tumour. It is plain, then, that in reducing this variety, the taxis should be applied in such a manner as to press the contents of the sac backwards, or very little outwards, and—if the tumour be large—a very little upwards also. This direction of force should be persevered in until the tumour disappears; but this disappearance is not a positive proof that the hernia is perfectly reduced; for a very small portion of intestine may remain within the short and concealed canal called the femoral ring. This canal lies deeply buried beneath the fat and glandular matter of the groin, and under the long tendinous margin of the muscles of the abdomen, called *Poupart's ligament*. (Fig. 1, g, e, f.)

It follows, that after reducing the tumour, the patient cannot return the last portions of the intestine into the cavity of the abdomen, by pressing with his fingers over the route of the canal, in the manner directed for common and concealed inguinal hernia. His only resource is, to place his index finger firmly on the spot where the last remains of the tumour disappeared, so as to compress the fat, &c., pretty strongly, but not so forcibly as to cause much pain or endanger inflammation of the part. He should then endeavour to carry his finger directly upwards, doubling and thrusting the skin before it, as though he intended to push it underneath Poupart's ligament. In this way he uses the skin, fat, &c.,



as a cushion, and succeeds in urging the last portions of the intestine through the ring, although his finger cannot reach or feel the spot at which the stricture sometimes occurs in this form of hernia.

The regulation of the taxis in umbilical rupture is extremely simple. Generally speaking, the contents of the sac are to be pushed directly backwards ; but the direction may be slightly varied, from time to time, in difficult cases. When the tumour disappears, the finger distinctly feels the edges of the opening through which it passes, and there cannot be any doubt remaining of the perfect reduction of the bowel.

Ventral, and other forms of hernia, are so various in their position and character, that it is impossible to lay down general rules for their reduction. If gentle taxis directed perpendicularly to the surface of the abdomen should fail to cause the return of the protruded parts, the patient would be much more likely to injure than to benefit himself by making any further attempts ; and must therefore wait for the assistance of his surgeon.

When there has been a stricture or partial strangulation of the tumour, and it has been reduced by the patient himself, there always remains some danger to health, which is greater in proportion to the difficulty of the reduction ; and some remedial measures are often necessary to prevent after accidents. The nature of these measures will not be mentioned here, for it is folly in those who are unacquainted with medicine to undertake their own treatment under such circumstances. The patient should apply as soon as possible to his surgeon or family physician.

The return of omentum from a hernial sac, generally takes place slowly, while that of a portion of bowel often occurs suddenly. It is laid down as a rule, by



writers, that the return of a bowel is recognised by a peculiar gurgling sound; but this sound is very often produced by handling the abdomen even where there is no hernia, and the bowel often passes up without producing any noise. There is therefore no method by which the patient can certainly determine what kind of intestine is contained in the sac, nor can he be sure of a perfect reduction except by feeling, and some knowledge of the natural form of the parts.

After giving a few short general rules, I shall conclude this portion of my subject.

1. The patient should never attempt to reduce a strangulated hernia for himself, without consulting a surgeon, if he can possibly obtain such assistance in reasonable time.

2. He should never leave his bed unless under the most urgent necessity, until the reduction be accomplished.

3. In all his attempts to return the protruded parts, he should pay strict attention to the attitudes directed in this chapter.

4. Taxis should never be applied suddenly or violently, and all unnecessary thumbing or kneading of the tumour is extremely improper. The patient should go to work slowly, steadily, and gently, remembering that, however great his experience in his own particular case, the surgeon may safely do many things which he cannot attempt without great danger.

5. In all cases of difficulty, even when ultimately successful, the necessity of medical advice continues for several days.

## CHAPTER IV.

### ON THE RETENTION OF HERNIA BY TRUSSES.

A TRUSS is defined to be a bandage or apparatus to keep a hernia reduced.

In olden times, before the elastic spring trusses came into use, many bandages and other contrivances were employed for the reduction of the intestines in inguinal and femoral hernia and their varieties; but, although we occasionally meet with machines of the same character struggling into notice at the present day, or reposing unregarded in that vast receptacle of odd whims and ingenious notions, the Patent Office at Washington, yet it appears that the elastic spring has become almost the exclusive means for making pressure in all the ordinary forms of the disease. I shall therefore avoid any attempt to draw from their obscurity the condemned remains of the earlier times of the science, and shall confine myself to the consideration of that class of instruments which still retain a portion of professional support and countenance.

There are two essential parts in every properly constructed truss—1st, the spring, by which the pressure is made. 2d, the *pad* or *block*, which is a mass of soft or hard materials, so modeled as to bear upon that part of the abdomen from which the intestines are disposed to protrude, in such a manner as to prevent all danger of such protrusion.

Besides these, there are several accessory parts,

some of which are found in all trusses, and which may be variously combined, according to circumstances. These are—1st, the *strap* and *spring-cover*; which is designed to protect the skin against the action of the spring, and to fix the truss by passing round the pelvis, so as to be attached to the pad or spring in front. 2d, the *back-pad*, seen in the figures of several of the instruments, in the after part of this work. 3d, the *thigh* or *perineal strap*, as seen hanging from the spring behind, or passed between the thighs and buttoned in front, in several of the figures. This strap is designed to prevent the pad or block from sliding upwards, and getting out of place during the motions of the body. In some patients who have very prominent abdomens, this strap has been elongated and thrown over the shoulder, to keep the pad from slipping downwards: it is then called a *scapulary*. Sometimes two or more straps have been employed, one as a thigh-strap, the others as scapularies.

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## SECTION 1.

### OF THE SPRING.

It was formerly customary to make the spring (so called) of soft iron, in order that the instrument might be bent in any direction to fit the form of the particular patient; but it was found that although the iron still possessed some elasticity, there was no security in the pressure of such a truss. A thin iron hoop

yields to accidents, such as falls, pressure, the protruding power of the intestines, &c., so easily that it is constantly getting out of shape. Soft iron, as a material for springs, has therefore been condemned; but some German surgeons of great eminence still employ a mixture of iron and steel for this purpose, so as to allow the instrument to be moulded to the form, while it retains considerable elasticity.\* But, though this plan will do very well for the posterior part of the spring, where it passes beyond the spine, which part often requires to be altered a little to fit the patient, and where a slight degree of elasticity is sufficient, because this part of the spring acts at a great mechanical advantage; it will, however, be found impossible to render the lateral parts of the spring, where the strain is greatest, sufficiently soft so as to be bent, without making them liable to get out of shape continually from slight and unavoidable accidents.

Many of the English surgeons have been induced by these considerations, to recommend the use of well-tempered steel for the manufacture of truss-springs:† this would answer very well if the old-fashioned semicircular instruments were now as generally approved of as formerly, and if there were no objection to the several contrivances more recently invented for attaching the pad to the spring in trusses of this character.

All instruments on the principle of HULL's patent require the use of steel; but the following quotation from one of the highest surgical authorities in Great

\* Arnold—Richter.

† Lawrence.

Britain, will best explain the estimation in which the semicircular springs are now held in that country and on the Continent.\*

“The spring of a truss has commonly been a semicircle, with the posterior end resting on the spine. CAMPER proposed to carry it round to the anterior superior spine of the ilium on the sound side; a plan highly approved of by SCARPA. Trusses of this form fit with a degree of steadiness, which cannot be given to others, by tightening the strap.” (*Surgical Dictionary, Art. Truss.*)

The Editor of the New York edition of the work just quoted,† differs widely on this point from the English surgeon; yet, after some reflection and numerous trials, I am forced to coincide with CAMPER and S. COOPER; but when the last named gentleman defends the propriety of making the long spring entirely of steel, his advice is liable to strong objections.

It is impossible to make a spring that will be at all secure, unless it fit pretty accurately to the form of the part of the body on which it is placed. The elasticity of the lateral part of a truss, enables it to accommodate itself sufficiently well to the contour of one half of the pelvis, in persons of various sizes; but when the spring is extended, as it should be, to the opposite side of the body, a slight modification of the curvature of the long end of the spring changes the action of the whole instrument, and it becomes necessary, either to make a truss expressly for each particular patient, or, to make the long end, of some

\* Mr. Samuel Cooper.

† David McCreth Reese, M. D.



material more ductile than steel. The former plan would require great skill in the workman, and it would be attended with increased expense; while the latter is at the same time much cheaper and more successful in practice.

Another strong objection to a spring entirely of steel, as recommended by MR. COOPER, is the difficulty of adapting the pad or block of the truss to the shape of the lower part of the abdomen in different subjects, when this part of the apparatus is attached firmly to the spring itself. This adaptation can only be accomplished by bending or twisting the front or short end of the spring, which is impossible if it be made of tempered steel. Even if once correctly applied, the absorption of fat under the pressure of the pad, and the changes in the figure of the patient arising from sickness or increasing fleshiness, not unfrequently require a corresponding change to be made in the bearing of the pad during the treatment. This cannot be done in the kind of instruments which are now under consideration. If, then, the pad or block be attached directly to the spring, the short extremity ought at least to be made ductile for some distance; but, if the portion of the flat hoop of metal upon which the pad is fixed be formed of soft iron, the most important part of the instrument becomes the weakest of the whole. There can be but little certainty then in the continuance of the proper action of the pad, whether we use iron or steel at this extremity; and it is therefore evident, that the pad *should not be directly attached to the flat extremity of the spring.*

The difficulties just mentioned, have led the advo-

cates of steel trusses to the invention of a great variety of contrivances to adapt the pad to the surface of the abdomen, and to regulate its pressure by means of pivot or hinge motions with or without accessory screws, springs, &c.—I have by me some dozens of my own improvements, modifications, &c. &c., of this character, the result of much study and a good deal of expense. All these children of the brain, however, have been unfeelingly condemned by their own parent. As there are still many contrivances of a similar kind before the public, attracting much attention both in Europe and America, it seems necessary to give some reason for objecting to a few of the most ingenious of these; and, in selecting the best subjects for criticism, I shall endeavour to choose those in which we find involved the mechanical principles of all the others: for, to notice every vaunted modification of the truss would require a folio of enormous size.



## SECTION 2.

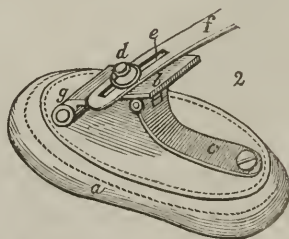
### OF THE ATTACHMENTS OF TRUSS PADS.

In order to admit of a self-adjustment or an easy regulation of the pad, various machinists have attached this most important part of the apparatus to the spring by means of a *pivot*, a *hinge*, or a *ratchet*, with or without an *accessory spring*.

An old and very ingenious contrivance with a regular hinge attachment is seen in fig. 2, in which a repre-

sents a soft elliptical or oval pad with a metallic back, on which is fixed the curved spring *c*, playing, by means of a small brass friction-roller, upon a brass slide *b*, which moves in a window *e*, in the main-spring. It is attached by a common hinge to the pad, and is fixed in the mortise by the rivet and nut *d*.

FIG. 2.—THE ROLLER-SPRING PAD ATTACHMENT.



- a* The elliptic pad.
- b* The slide on which the roller plays.
- c* The curved spring of the pad.
- d* The nut securing the slide to the main-spring.
- e* The window in the main-spring, to give play to the slide.
- f* The main-spring.
- g* The hinge of the pad.

This contrivance has undergone several modifications. The figure is taken from MARSH's patent, and it is very obvious that the design of the attachment is to enable the pad to adapt itself to the changes in the form of the abdomen in various positions of the body.

I shall first endeavour to show that this power of adaptation is unnecessary; and, secondly, that the attempt in this instance may produce serious inconvenience, and cannot effect the purpose just mentioned—and in so doing, I shall confine myself to the consideration of inguinal hernia, as the form alone of the pad evidently renders the apparatus unfit for any other kind of rupture. But this subject can only be thoroughly

understood by professional men, which will account for the use of technical terms in this place.

The situation of Poupart's ligament, supported firmly by its connexions with the anterior superior spinous process of the os ilium at the one extremity, and the os pubis at the other, renders it almost incapable of motion. It remains stretched like a cord between two fixed points. The fascia lata of the thigh may have some influence upon it during certain movements of the lower extremity, but the extent of this influence is extremely slight, and the effects of the contractions of the obliquus externus muscle upon this part of its aponeurosis is even less considerable. These motions are important, it is true, in their bearing upon the reduction and strangulation of hernia, but their relation to the action of trusses is not worthy of calculation. The abdominal rings, canal, and the whole site of inguinal hernia being close in the neighbourhood of Poupart's ligament, these parts are liable to very little change of shape.

The whole pelvis, together with the parts which are embraced in a truss, and indeed all those portions of the front of the abdomen which lie below the fleshy margin of the obliquus internus and transversalis muscles, follow all the changes in the position of the body without any material alteration of their form. If the pad of a truss were made so large as to rise far above the margin of the two muscles just mentioned, it might indeed be influenced to a considerable extent by their contractions; but such a pad should never be employed, for reasons which will be noticed hereafter.

It is true that the motions of the abdominal viscera under muscular action, their state of distention, and the variations of the subcutaneous and abdominal adipose matter, do frequently effect considerable changes in the

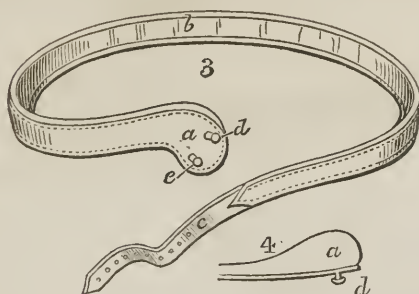
general convexity of the parts necessarily covered by the pad; but the adaptation of the pad to these changes is best accomplished by the elasticity of the main-spring of the truss. These causes do not alter the relative position of the internal and external abdominal rings, and this alteration is the only one which could be compensated by the back-spring of the pad, supposing that it fulfilled any useful purpose at all.

The surgeon will be immediately convinced by applying a pad attached according to this method upon his own person, that it does not adapt itself to the changes in the form of the abdomen. He may throw himself into any desired attitude, and he will perceive no material change in the position of the pad. Should he propel the bowels suddenly downwards or upwards by the action of the abdominal muscles, so as to increase or diminish the convexity of the lower part of the abdomen, he will find that the play of the pad-spring is exceedingly slight, and that the change of form acts almost exclusively upon the main-spring; for the latter yields readily, in consequence of its great length, while the former must be strong in order to cause sufficient pressure at the lower edge of the pad, where it acts at a great mechanical disadvantage. The spring and roller attachment is therefore even less commendable than the permanent attachment of the old truss, in which the pad sits directly on the broad anterior end of the main-spring, as represented in fig. 3.

There is a truss much recommended in England, called the bellows-spring truss, but it has nearly passed out of use in this country. It does not differ materially from the one just described, except in having the pad-spring of spiral steel wire, wound into



FIG. 3.—THE OLD FASHIONED COMMON TRUSS.



- a* The enlarged end of the main-spring, supporting the pad.  
*b* The main-spring enclosed in the spring-cover.  
*c* The pelvic strap.  
*d* The button for the pelvic strap.  
*e* The button for a perineal strap when used.

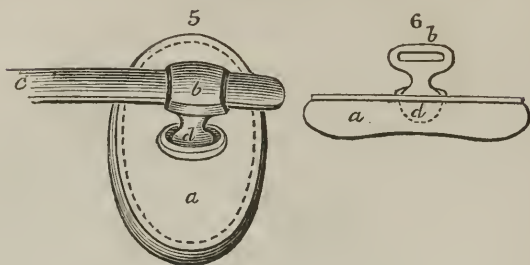
FIG. 4.—A LONGITUDINAL SECTION OF THE PAD.

- a* The pad.  
*d* The button for the pelvic strap.

the form of a cone, the summit fixed to a permanent expansion of the main-spring, and the base resting on a pad-plate with a hinge attachment, the pad stuffed with horse-hair, or other similar materials, and the whole cased in soft leather. No figure of this pad is given, because the principle on which it acts is precisely similar to that of the spring and roller-pads.

The third form of attachment is the ball and socket. Views of this are seen in figures 5 and 6, taken from a very old truss, patented by SALMON & O'DY, in England, as now frequently imported under the name of the French or English truss. The character of this kind of attachment is so well known that it scarcely requires description. It is met with in the surveyor's staff, and in a great variety of other instruments; and in rupture trusses it allows the pad

FIG. 5.—SALMON &amp; ODY'S PATENT BALL AND SOCKET ATTACHMENT.



- a* The elliptical pad.  
*b* The sliding ring by which the ball is attached to the spring.  
*c* The anterior end of the semicircular steel main-spring.  
*d* The ball seen enclosed in the socket on the centre of the back of the pad.

FIG. 6.—LONGITUDINAL SECTION OF THE PAD.

The letters having the same reference as in fig. 5.

to turn in every direction, so as to apply itself exactly to the surface on which it presses. At first sight this would seem to be the most perfect arrangement possible, but in reality it is the least secure of all.

By the ball and socket, one point on the pad is fixed, while all the others are moveable; and if the orifice of the hernial sac were always exceedingly small, and the fixed point could be perfectly secured directly above that orifice, so as never to change its position, the instrument would be an admirable one: but neither of these conditions is possible. Whenever the fixed point rises above the ring, as it will do occasionally, in spite of every precaution, the propulsive force of the bowels has a tendency to tilt up the lower edge of the pad, and thus to open the passage. There is nothing to resist this tendency, except the pressure of the upper part of the pad upon the sur-

face of the abdomen, which is compressible and yielding, and there is therefore no sufficient security in its action.

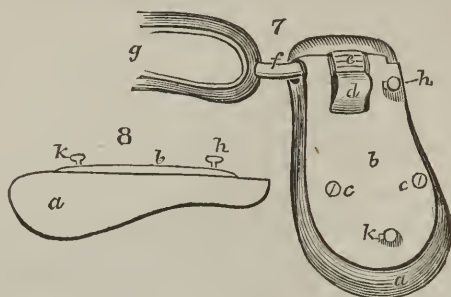
But this is not all. The very principle of the instrument requires that the pad should extend *as far above the abdominal ring as it does below*; and, consequently, its upper portion must extend to those parts of the parietes which are constantly changing their shape with the motions of the body. Every time that the patient leans forward and contracts the abdominal muscles, the bowels are urged downwards, and the parts beneath the upper half of the pad are flattened. The pad itself must follow these changes—the lower half is tilted up, and the lower part of the ring left but very slightly guarded. If the centre of the pad happen to slip up at such a moment, the pressure of the truss, instead of retarding, actually tends to promote the escape of the intestine!

In this country, DOCTOR HULL has patented a modification of this attachment. Instead of a ball and socket joint, he employs a combination of staples, which makes a universal joint with a “limited motion;” the pad turns in all directions to a certain extent, and is then checked. This plan is perhaps less objectionable than that of the ball and socket; but, if the views just given be correct, it is imperfect precisely in the same degree that the pad is moveable. I do not think it necessary to give a figure of this attachment, as it may be seen at almost all the drug stores.

The last form of attachment to be noticed is the ratchet, which has been employed for many years, with

pads, or blocks of wood or ivory; the time of its first introduction I have not as yet been able to ascertain, but it is old.

FIG. 7.—THE RACHET TRUSS ATTACHMENT.



- a* The old-fashioned wooden block of EBERLE'S truss.
- b* The iron block-rider or plate.
- c* *c* Screws attaching the block-plate to the wood.
- d* The ratchet.
- e* The ratchet-wheel.
- f* The iron neck of the wheel.
- g* The main-spring.
- h* The pelvic strap-button.
- k* The perineal strap-button.

FIG. 8.—Longitudinal section of the truss-block of EBERLE'S truss—  
The letters having the same references as in fig. 7.

One of the main objections to this arrangement is, that the pad cannot be varied in its position to suit all the peculiarities in the form of the part in different patients; every time it is altered in its bearing, the extent of the alteration is determined by the number of cogs on the pivot over which the spring has passed. Now as the pivot is small, the number of cogs cannot be made numerous without weakening them and rendering them too small to be consistent with proper security. At each alteration of the ratchet, the pad is therefore compelled to pass through a large arc of a circle, and

cannot adapt itself properly to the varieties of shape, which in this part of the abdomen are always slight.

But in addition to this, the ratchet is subject to the same objection that has been made to all the preceding forms of attachment, except the ball and socket with its modifications; it varies the position of the pad in one direction only, while the required changes are indefinite in number.

In closing the subject of attachments, it is proper to mention that a great multitude of modifications have been thrown before the public from time to time. All that are accessible have been examined and compared, and they are found to range themselves under one or other of the preceding heads. In some instances, indeed, additions have been made to the essential parts of the apparatus, which only increase their apparent complexity, and enhance their price, without effecting their mechanical operation on the disease.

It appears, then, that the various modifications of the pad attachment now in general use, possess no advantages over the original fixed pad which are not more than compensated by corresponding defects; yet the very circumstance, that so many changes have been attempted, is a sufficient proof that the original truss-pads are defective in their action. This deficiency results chiefly from the difficulty of bending the broad anterior extremity of the main-spring in such a manner as to adapt the pad to the peculiar form of individuals, and it is remedied at once by connecting the pad or block to the spring, by means of a shorter or longer neck of soft iron intervening between the plate that supports the pad or block, and the anterior end of the spring, as seen in the illustrations of all my trusses for inguinal and femoral hernia. This neck admits of being bent or twisted by



the surgeon in any direction, so as to change the bearing of the pad in every possible manner, while it has sufficient firmness to resist the pressure of the spring, and to prevent any alteration from accidents; it therefore fulfills all the indications of a pad attachment as completely as possible.

In order to accommodate the same truss to patients of different sizes, many instruments are provided with a sliding apparatus designed to elongate or shorten the anterior end of the main-spring, and to carry the pad nearer or farther from the middle line of the body; one of these is seen in the mortise and screw in fig. 2, p. 42. They may be regarded as parts of the pad attachments, but, as they are very numerous, I shall not attempt to describe them here. Having examined and compared them all, I have adopted and improved this part of the apparatus so as to admit of a single adjustment of the pad in inguinal, and a double one in femoral hernia, combining facility of movement with security, and depriving the patient of the power to regulate the bearing of the pad according to his momentary caprice—a power which would be very unsafely placed in the hands of any one unacquainted with the anatomy and pathology of hernia. This improvement will be described when the new instruments are introduced to the notice of the reader.

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### SECTION 3.

#### OF THE FORM OF PADS OR BLOCKS.

Before entering upon the consideration of the several pads now commonly in use, it is necessary to

premise a few remarks on the design of these portions of the apparatus, in order to establish some general principles as guides to correct criticism.

The principal object of the surgeon in the application of a truss, is the retention of the intestine; and the extreme importance of effecting this in a perfect and permanent manner, has been explained in a previous chapter. If an instrument fail in accomplishing permanent retention, it necessarily increases the danger inseparable from the disease. The pad is the immediate agent of the retention, and all other parts of the apparatus are merely accessory.

Now it has been already explained, that the direct cause of hernia is a deficiency in some part of the walls of the abdomen; and it follows of course, that the best form of pad is that which most fully supplies this deficiency.

If the tendons of the abdominal muscles were uncovered, and were rendered inflexible by the outward pressure of the contents of the abdomen, this form might be easily determined. All that could then be required, would be the application of a firm substance, with a surface corresponding with the natural form of the part, and a very little larger than the accidental passage that we wish to close. But these tendons are flexible, and, to a certain extent, yielding: moreover, they are covered by the skin, and generally by a mass of subcutaneous fat. If then a pad, or that portion of a pad which bears upon the hernial orifice, be not made much larger than the opening in the tendons, it pushes the skin and fat before it into the space left vacant, and has a constant tendency to

enlarge the opening and increase the cause of the disease.

In common inguinal hernia, we have two openings connected together by a long canal, and, though the upper orifice be the most important, it is highly desirable that the canal also should be closed by the instrument; for in this way only can it render the retention sure. The pad must therefore be made much larger than the ring; but, as it regards the dilating effect of the pad, it is a matter of indifference whether it be increased in length or in breadth, for the edge of a ruler would have as little tendency to enlarge a small orifice as would a body of much greater diameter.

Whatever be the form of the pad, the greatest pressure should be extended over the parts required to be closed; and much inconvenience results from the attempt to distribute it widely over the surface; for, as it is necessarily considerable at one point, if the pad be too large, the strength of the spring must be proportionally increased: and as the whole force of the spring must be borne by the contents of the abdomen, this increase soon becomes very uncomfortable in its effects.

If the pad be so constructed as to press partly upon portions of the abdomen that are nearly fixed in their position, and partly upon portions that are moveable, it is impossible that it should continue steady in its action or produce safety to the patient: for, if properly adjusted in one position of the body, it cannot remain so in another.

These points being settled—and I think no intelli-

gent surgeon will dispute them—we will pass to the consideration of the forms of particular pads.

The pad of the old truss, seen at figs. 3 and 4, p. 45, is shaped somewhat like a pear cut in half, the stem part curved considerably, with the concavity directed downwards, and continued into the buckskin spring-cover. Now, any surgeon will perceive at once, and any patient may discover by referring to figures 1 and 4, that this form has very little relation to the position of the internal abdominal ring, and the route of the abdominal canal. The lower drooping end of the pad is obviously intended to cover the external ring, and it answers this purpose better than most of the more recent contrivances; but, as already observed, this is the least important point in common inguinal hernia, and it is only in the ventro-inguinal variety that it can claim the character of a tolerably good instrument. It does not secure the patient fairly against concealed hernia, even when properly applied; hence the very frequent complaints of indigestion, pain in the abdomen, and generally uncomfortable feeling, made by patients using these trusses, and others with pads of a similar form.

It is probable that the practical experience of this difficulty has led to the enlargement of the pads of these trusses, which often cover three times the necessary space, and are thus rendered liable to still further objection. They are intended alike for common inguinal and ventro-inguinal rupture,—two varieties of the disease involving different anatomical parts, and therefore requiring different modifications of the pad. One form of instruments known as HEINTZELMAN'S gum elastic trusses, is fashioned pretty much after this model.

The pads of the spring and roller truss, (fig. 2, p. 42,) the bellows-spring truss, and the old wooden-

block ratchet-truss, (figs. 7 & 8, p. 48,) are also pyriform ; but they are straight instead of being curved, and attached to the anterior extremity of the main-spring, nearly or quite at a right angle. They act on the external abdominal ring, but it is very difficult to make them cover the internal ring, and they are therefore generally incapable of preventing the intestine from entering the canal. This position is the proper one for femoral hernia ; but neither the form of the pads nor that of the instruments are well adapted to the treatment of this species of rupture.

These pyriform pads do not act with sufficient certainty, even upon the external abdominal ring in ventro-inguinal hernia ; for their lower extremity is circular, and does not correspond with the form of the brim of the pelvis ; so that the intestine can escape on one or other side of the pad, if the orifice be large.

In the round, oval, or elliptical pads, there are two important circumstances to be considered : first, the form of the disk, and secondly, that of the inferior or pressing surface. A fair specimen of one of these pads is seen at fig. 2, p. 42 ; and, as far as the disk is concerned, there is little variety observed among them ; they all approach pretty nearly to the circle ; and hence the great objection to be urged against them. A circular pad of any considerable size, whether concave, convex, or flat upon its under surface, can never adapt itself to the form of the lower part of the abdomen, where the parietes may be cut or divided in any direction without presenting a circular section : and although, by employing great care and force, such a pad may be made to retain a common inguinal hernia with tolerable certainty, it accomplishes its purpose by depressing and changing the natural shape of the parts on which it



acts, and consequently exerts unequal pressure on those parts.

The spots where the greatest force is exerted are situated on the margin of the pad, particularly at the upper and lower part of the edge ; but the situation where the greatest pressure is required is at the centre of the pad, where the main-spring is attached, which point should be placed immediately over the internal ring ; for otherwise there would not be any security to the canal, which it is always desirable to obtain if possible.

This necessity of fixing the centre of the pad upon the site of the internal ring, causes it to press upon as large a surface above, and on the outside of the abdominal canal as it covers below, and on the inside of that passage ; from which results a double difficulty. First, the pad is necessarily made to cover more than twice the space involved directly or indirectly in the disease ; and consequently, in order to produce the requisite resistance to the propulsion of the intestine, more than twice the force otherwise sufficient must be exercised by the main-spring.

Secondly, the lower half of the pad is made to bear upon that part of the abdomen which is comparatively fixed in its position, while the upper half presses forcibly upon the more moveable portion of the surface, above the edges of the obliquus internus and transversalis muscles ; of which the motions are continually transferred to the instrument, rendering its action unsteady and uncertain. The effect of this last cause of embarrassment is much less marked when the pad is permanently fixed upon the main-spring, than when it is attached thereto by a ball and socket ; but even in the

former case, it is sufficient to produce serious inconvenience.

With regard to the proper form for the posterior or pressing surface of the circular pad, there has been a great diversity of opinion among surgeons. Some contend that it should be convex; others, plain; and others again, concave.

As the circular form has been already condemned on general principles, it seems scarcely necessary to dwell at much length on these disputed points; I will therefore confine myself to a very few remarks upon the subject.

A gentle convexity of the under surface, certainly contributes to the power of retention at the internal ring, and it likewise renders the pad more steady, by preventing it from being quite so easily disturbed by the motions of the abdominal muscles. If, on the contrary, there be a very great degree of convexity, the pad acts as a distending force, and increases the size of the unnatural passage which it is intended to close.

Therefore, if we do use the circular pads, they should be made with a gentle convexity, which is preferable to either of the other forms.

The concave pad so much lauded by some truss-makers and venders, and which has received the countenance of a few men of high distinction in the profession, is, in all ordinary cases a very bad contrivance; for it is liable to all the strictures urged against the circular disk, to a still greater degree than either of the other forms, with the additional objection that it provides a matrix for concealed hernia in its own cavity, which seems as if it were designed for the express purpose of permitting the intestine to occupy the ring undisturbed while the instrument is worn.

I do not pretend to say that no cases of inguinal hernia can occur in which a concave pad may be useful ; but such cases are rare, and result either from congenital malformation, or from the circumstance that the contents of the sac cannot be entirely reduced.

Among the very numerous modifications of circular and oval pads, there is one of a very singular form which we see attached to some of the instruments known as HEINTZELMAN'S trusses. This is a circular disk coated with a thick pad of gum elastic, with an elevated circular edge surrounding the pressing surface, and immediately within this, a deep concentric groove ; the central part of the surface within the groove, rises into a small spherical segment with an elevation equal to that of the edge before mentioned. As I can form no idea of the design of this groove, without which the pad would be a plain one, I shall rest contented with a simple notice of its existence.

It is evident that the circular and oval pads are subject to the same objections in ventro-inguinal hernia, which were mentioned when the pyriform pads were under discussion. This circular edge is not sufficiently well adapted to the form of the brim of the pelvis, to give security to the bowels when the external ring is considerably dilated, as it almost always is in this variety of rupture.

The only species of hernia in which circular disks are properly employed, is the umbilical ; and the pad in cases of this nature requires to be varied in form according to the extent of the orifice. The old fashioned plano-convex pads are very rarely applicable on correct principles. The form adopted in my umbilical truss, is fashioned after the natural shape of the parts, and is found to be the most successful in a very large

majority of cases. At first sight it would seem to be inconsistent with some of the principles laid down in the commencement of this section ; for the small central segment of a sphere appears well calculated to act as a distending force, and the wide margin of the block distributes the pressure over a large surface ; thus requiring increased strength in the spring. But when it is recollected that the spot where the intestine protrudes in umbilical hernia is naturally depressed, the absolute necessity for some prominence on the pad corresponding with this depression, in order to secure the perfect retention of the intestine, is clearly perceived.

In order to prevent this projection from acting with a distending force, it is equally requisite that the margin of this block should be expanded, so that, by its pressure on the surrounding skin and muscles, it may prevent the spherical segment from passing to a greater depth than the surface of the *linea alba* or tendinous band through which the protrusion takes place. The regulation of the form of these blocks for particular patients requires much care, and sometimes the absorption of the fatty matter so constantly found about this part, demands a change of the block in the course of the treatment.

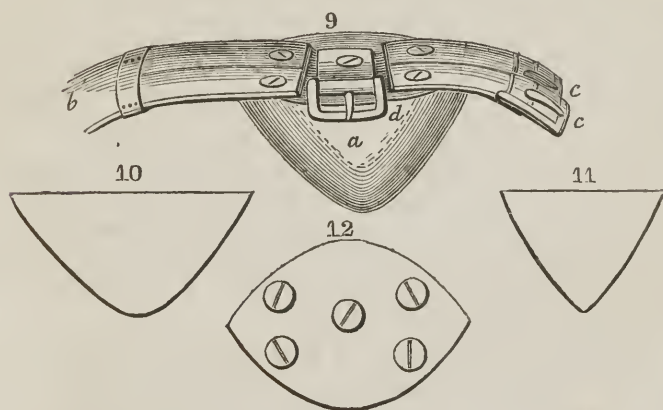
Fortunately, the instrument acts much more directly in umbilical, than in any other ruptures, and comparatively little force is therefore required to retain the bowel. This compensates for the unavoidable difficulty resulting from the enlargement of the block, enabling a spring of moderate power to accomplish the purpose of the surgeon ; and patients do not complain of the pressure more than in other forms of the disease. If soft pads are employed in the treatment of umbilical hernia, they should be constructed on the same model ; but their

very nature renders it impossible for them to act with equal precision and certainty.

The next form of pads or blocks which will be noticed are the compressed conoidic blocks, that have hitherto been composed of lead or tin.

The figures, from 9 to 12, represent what is believed to be the origin of these blocks. It is a heavy piece of solid lead, screwed fast to one end of a leather strap without a spring, and furnished with three buckles, screwed to the lead in the same manner with the strap. The latter is designed to surround the pelvis, and is divided into two bands at about the distance of a foot from the other end; so that these bands may be secured

FIG. 9.—THE LEADEN CONOIDIC BLOCK AND STRAP.



*a* A mass of lead of a conoidic form.

*b* The pelvic strap.

*c c* The buckles for securing the pelvic strap.

*d* The buckle for the perineal strap.

FIG. 10.—A longitudinal section of the lead, perpendicular to the base.

FIG. 11.—A transverse section perpendicular to the base.

FIG. 12.—A full view of the base and screws.—The strap and buckles detached.



to the uppermost buckles of the block. A thigh-strap, simply sewed to the principal one behind, is intended to be secured in front to the third buckle.

This strange bandage comes from the west. It is said to be patented! though, by its simplicity and peculiar unfitness for the purpose in view, it might be supposed to belong to an age of rude antiquity. It can hardly be imagined that any one, however slightly acquainted with the complaint, would fail to condemn this strange machine, as about the best possible contrivance to render a hernia worse! Yet, singular as it may seem, the specimen from which the figure was taken, bears evident traces of having been in actual use! It is known as PRICE's truss.

There is another patent in existence for a leaden block of the same general figure, appended to a spring in due form, but shaped with somewhat more regard to human feelings. It is not thought necessary to represent it. It is called DR. SEMPLE's patent truss.

Having now examined the several essential forms of truss-pads in use before the time of the introduction of STAGNER's patent, it only remains for me to notice the impossibility of acting successfully on a femoral hernia by means of either of these pads.

Although the anatomy of this species of hernia has been so long and so thoroughly studied, it seems as if the structure of the pads had been totally neglected by those who have laid down rules or contrived instruments for its retention.

The books direct that the main-spring of the inguinal truss should be bent downwards, until the pad be made to rest upon the upper part of the thigh, instead of the abdominal canal and rings: but no change is made in the form of the pad. Now, a consideration of the route

pursued by the intestine will at once convince the surgeon who will take the trouble to apply the first principles of mechanics to this very simple question, that such a change is indispensable.

In femoral hernia, the intestine in the first instance protrudes downwards through the femoral ring or canal, and it is only after it has made some progress that it rises forwards from beneath the division of the fascia lata. In inguinal hernia, on the contrary, the protrusion takes place, at first, forwards and a little downwards through the internal ring, and travels, consecutively, downwards and inwards along the abdominal canal. Common sense, then, would dictate the propriety of resisting the exit of the intestine in femoral hernia, when once fairly reduced, by means of a force acting from below upwards, if such a force can be employed. But in inguinal hernia, it is obviously proper that the force should be exerted in a direction backwards and a very little upwards. The question of the possibility of accomplishing both these purposes with the same pad, scarcely deserves an answer.

It is unnecessary to analyze the modes of action of the several forms of pad heretofore employed upon femoral herniæ, for they are pretty nearly similar in all cases. Pressing upon the surface of the groin below Poupart's ligament, they may effectually prevent the protrusion of the intestine forward through the part left unguarded by the fascia lata. If the surface of the pad be concave, even this advantage is lost, and should it even be made very convex, it can have no action upon that portion of the hernial sac or its contents which lies above the extreme lower edge of Poupart's ligament.

None of the pads in common use, then, are capable of permanently retaining a femoral hernia.

Attempts have been made, it is true, to remedy the defects just noticed, by placing the pad *so as to act upon Poupart's ligament itself*, as well as upon the groin, with the intention of compressing both that tendinous margin and the commencement of the ligament of Gimbernat, so as to close the funnel formed by the transversalis and iliac fasciæ at the commencement of its neck; and if this end could be accomplished, there would be nothing left to desire.

But the strong compression of the vessels and nerves of the lower extremity as they pass over the brim of the pelvis, without which it is impossible to close the femoral ring in this manner, cannot be tolerated by the patient; and even should his courage induce him to sustain the experiment, it would still, in all probability, prove unsuccessful. The pressure is exerted in a direction at right angles to the route of the intestine in its first exit from the abdomen, and the pressure of the instrument on one hand, with the resistance of the os pubis on the other, resembles the action of a pair of pincers. Every machinist knows how much more power is required to produce retention in this manner than when the retaining force is opposed directly to the propulsive force. I have actually seen Poupart's ligament lacerated by a wooden block employed in the manner described, without securing the patient against a return of the hernia!

If less violence be used, and the exit of the intestine be generally prevented, still the stretching of the ligament by the action of the abdominal muscles, which is continually occurring, raises the pad and re-opens the ring, leaving the patient in danger of contusion or strangulation of the intestine by the truss, if, at such a moment the latter should happen to escape.

I have met with several assertions and some certificates, but as yet, with no satisfactory proof of the radical cure or permanent retention of femoral hernia by the trusses commonly employed. The history of my own apparatus and its results will be given in the sequel.

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## SECTION 4.

### ON THE MATERIALS FOR PADS OR BLOCKS.

The pads for all the trusses which have been in general use till within the last two years, except the pad with a ratchet attachment, have been constructed of soft or elastic materials. The ratchet pad or block has been formed of wood or ivory, and is of very long standing. The existence of these ivory blocks is noticed in the Report of the Committee appointed by the Philadelphia Medical Society, in 1835, and the chairman of that Committee stated during the subsequent debate, that he clearly recollected such instruments among the surgical apparatus of the Pennsylvania Hospital in his boyhood; but that they had never been employed in practice in that Institution since he entered it as a resident pupil in 1818. It is somewhat singular, however, that the use of wooden blocks was not known to the Committee at the time of the Report, nor until a specimen was produced before the Society by DR. PERRINE, at the meeting which received the Report.

The written communication of the gentleman just mentioned, contained some details of several cases (for the most part those of young persons) in which a radi-

cal cure had been apparently effected by such instruments in the hands of his preceptor or in his own; but I have already remarked that such results occur sometimes under the use of almost any of the instruments, and the evidence was not sufficiently ample or complete to establish the superior claims of these blocks. The trusses mentioned by Dr. PERRINE, were known by the name of EBERLE's trusses; the vender, and perhaps the inventor, being a celebrated instrument-maker of Philadelphia, some years ago; they may have had an earlier origin, but it would not be proper in me to enter into any examination of this point until the completion of the labours of the Committee, whose Report, to which I shall have frequent occasion to refer, was merely a preliminary one. These trusses were generally disused, and might have been regarded as entirely forgotten in Philadelphia, but for the remarks of Dr. PERRINE, and the presentation of two patients at my office who had worn, and still continued to wear them.

This neglect, or rather condemnation, is easily accounted for, not on the ground of the substance employed, but on that of the form of the blocks. Having noticed the defects of the form in the preceding section, I will merely repeat that a glance at figs. 7 and 8, p. 48, will show at once that it is not in any degree adapted to the anatomical structure of the parts involved in hernia, except, perhaps, in the ventro-inguinal variety, and but very imperfectly even there. One objection, however, against the ivory pad deserves a passing notice. Its surface is so exceedingly smooth, that there is scarcely any friction between it and the skin, and it is therefore difficult to make it retain its place when applied.

After these remarks, it will be perceived that the question of the comparative advantages of soft and hard



materials still lies completely open to discussion, and we may now fairly enter upon it.

No surgeon would pretend to deny that the best possible form for a pad or block for retention, is that which at all times and under all circumstances, is most perfectly adapted to the anatomical structure of the parts on which it presses without contusing or injuring them. Starting, then, from this point, and considering, for the present, the retentive power alone, without touching upon the question of radical cure, let us examine the relative merits of the soft pads and hard blocks.

It is evident that both these contrivances may be equally well adapted to the anatomical form of the parts in the first instance, while the patient remains in any fixed attitude; but, on a change of posture, this form is more or less altered. A soft pad may adapt itself to this alteration, but the hard block cannot, and this, at first sight, seems almost to decide the question in favour of the former. Still, two very important circumstances must be taken into account in arriving at a correct conclusion.

Except in femoral hernia, of which I shall presently speak, the parts covered by any pad or block which is not shown to be improperly formed by the principles laid down in the last section, are liable to very little alteration in any of the motions of the body, and that little is compensated much better by the general flexibility of the walls of the abdomen themselves, when under the action of a hard block, than by the compression of a soft pad; and if the latter be made sufficiently pliable to yield to all the changes of the surface, which are neither considerable nor violent, another change of some importance, but strangely overlooked by many, may, and often does take place. The propulsive force of the

intestines, increased by any great exertion of the patient, and acting upon a small part of the pad only, compresses that part, and the intestine escapes from the abdomen! This is an accident that is opposed by only a small portion of the strength of the main-spring of the truss; but when a hard block of a proper shape is employed, the intestine cannot possibly protrude without meeting the whole force of the spring. The advantage, so far, is evidently in favour of the hard block.

The parts about the site of femoral hernia, are liable to extensive and powerful motions, but there is still a portion of the surface immediately below Poupart's ligament, which undergoes but little change during the motions of the lower extremities. If either the pad or the block used in this form of rupture are large enough to be acted upon by the muscles of the thigh, both are alike incapable of effecting or preserving perfect retention; and all the instruments now in general use, lay open to this objection: but when the necessary pressure is made by a small body, and confined to the less moveable part of the groin, the hard block enjoys all the advantages over the soft pad that have been already noticed.

The other circumstance to be taken into account in this comparative estimate is, that the soft pad has one inconvenience peculiar to itself, and which, alone, should be sufficient to lead to its rejection, when any other equally safe means of treatment can be devised; this is the impossibility of giving it a permanent form. The constant pressure to which it is subjected, together with the effects of perspiration and accidental moisture on the material of which it is formed, sooner or later put it out of shape; and if

properly adapted, in the first instance, *for that very reason*, it cannot long continue so.

The next question that arises is, the comparative danger to the intestine or peritoneum from contusion. Judging upon mechanical principles, this danger would appear to be greater when wooden blocks are employed. If the application of the trusses were left to careless or unprofessional hands, this consideration would be of serious consequence; and it certainly is so, when ill-contrived instruments are used. A portion of intestine pinched between the pad or block of an inguinal truss and the brim of the pelvis, and allowed to remain a short time in that condition, would be liable to serious, and sometimes fatal injury whether the material of the pad were soft or hard; but the risk would undoubtedly be much greater in the latter, than in the former case, and I have no desire to weaken the strength of the argument. As the Committee whose Report has been already quoted remark, "the danger is grave in just proportion to the power and usefulness of the apparatus;" when rightly managed that danger never occurs.

The soft pad is also dangerous under such circumstances; and, if it purchase some slight comparative *safety*, it does so at the expense of great *uncertainty*. If the accident be less severe when this contrivance is employed, it is also much more likely to happen.

But, in fact, this argument is more specious than real, when applied to the selection of the best instruments. When an inguinal, or ventro-inguinal pad or block is of the right shape, and is applied upon

the right place, it cannot pinch the intestine in the manner described ; for if protrusion should occur, as sometimes happens before the instrument is properly adjusted, and, occasionally, but very rarely, at a later period, the intestine readily pushes the edge of the pad upwards, so as to relieve itself from all immediately dangerous pressure ; and the patient himself, following the directions of his surgeon, or those contained in this work, at once relieves himself of inconvenience.

Ill-constructed pads or blocks that are made to overlap the brim of the pelvis, (and there are many such in use,) are dangerous indeed ; but the hard block has this great advantage over its competitor, particularly in ventro-inguinal hernia : if it do not overlap the pelvis in the first instance, it never can do so afterwards, when properly applied. But the soft pad cannot be so formed as to retain a ventro-inguinal hernia with any great certainty, even at first, without overlapping the pelvis ; and though successfully modeled it will not long retain its shape.

So much has been said in various quarters, as to the irritation and inflammation produced by the blocks, and of the necessity of three or more blocks being applied successively, for the purpose of regulating the degree of inflammation as the case advances towards a radical cure, that many patients have been reasonably alarmed lest some serious danger of internal inflammation might be induced by such a course of treatment. Now, the folly of employing more than one block in each case has been pointed out in the early part of this work ; and the patient may rest assured that neither danger nor ma-



terial inconvenience can result from the use of these instruments in their present state of improvement.

Besides the soft pads and hard blocks, there are certain other intermediate materials employed by some in the construction of this part of the truss, designed to be both firm and elastic.

Sometimes the elasticity is obtained by means of the stuffing of pads covered with buckskin, sheepskin, calico, &c. Horse-hair is used for this purpose in the bellows-spring truss; but, like all other articles of the same description, it becomes flattened, and loses its elasticity in a short time: it is rendered more unsafe by the extreme uncertainty of its action. Cotton is also used, but soon collects itself into lumps and inequalities, which are still more dangerous.

Latterly, pads have been constructed entirely of India rubber, or gum elastic, as in *some of the patented trusses of HEINTZELMAN*. At first sight this appears to be a very desirable improvement; but experience teaches us that India rubber, applied for some time to the human skin, produces redness followed by excoriation, a cutaneous eruption resembling the effect of tartar emetic when employed externally, or a complete blister on the part. I have the testimony of a surgeon of established reputation in Philadelphia, that he was himself blistered by a truss covered with, or formed of, this substance; and I have recently employed it with very decided effect as a means of revulsion, by producing pustular or vesicular eruption.

But even if an elastic pad should be covered with buckskin, or any other flexible substance calculated



to prevent irritation, it would still remain to be proved that the elasticity was a real advantage, a thing by no means to be taken for granted.

In closing this examination of the relative claims of the various materials used in the construction of pads and blocks, I cannot do better than quote the words of the Report already so frequently mentioned, as published in the *American Journal of the Medical Sciences* for February, 1836. The character of the gentlemen composing the Committee from whom that Report emanated, is well known to the profession and the public; their opinion, as disinterested observers, at a time when the instruments were much less perfect than at present, and the amount of evidence much smaller, will no doubt exert due influence upon those who have enjoyed no opportunity of personally examining the question.

“ The Committee are decided in the opinion, that the retentive power of solid blocks exceeds, *cæteris paribus*, by considerable difference, that of pads composed of softer materials. If there could be any exception taken to this rule, it would be in favour of pads formed of very firm but highly elastic materials; but the only substance of the latter character now employed in the construction of truss-pads, is the gum elastic, and against the direct application of caoutchouc to the skin, there are strong physiological objections. Moreover, the Committee is by no means prepared to advocate the superiority of elastic pads, in the present state of their knowledge. Whatever they may gain in facility of application, they lose in certainty of action. The great excellence of the solid truss-block is its perfect precision, and if

required to adapt itself to changes of position in the part to which it is applied, it can be enabled so to do by the elasticity of the spring of the truss.

“Two circumstances should be stated in this place:—the incompressibility of very firm pads and hard blocks, renders it of the utmost importance that their form should be accurately adapted to the particular parts on which they are designed to act; and that they should be carefully placed and secured in correct relation with those parts. Carelessness in either of these respects would incur dangers, grave in just proportion to the power and usefulness of the apparatus. Hence considerable anatomical and surgical skill are requisite, both in the contrivance and the application of trusses armed with such pads or blocks, and they can never be permitted to pass, with safety, out of the hands of surgical scholars and practitioners.

“With regard to other dangers and inconveniences, your Committee will merely remark, that the charge of danger of general peritoneal inflammation from the communicated irritation of the blocks, when their application is directed by competent skill, is deemed nugatory, and in opposition both to well-known pathological laws and the direct evidence of experience. The danger of suffering from the production of external inflammation is, in general, slight and unworthy of much thought,” &c. Rep. p. 322.

And again—“The Committee, therefore, think that these alleged dangers do not appreciably affect the permanent retentive power of the apparatus.”—*Ib.* p. 323.

## CHAPTER V.

### HISTORY OF THE PROGRESS AND PRESENT STATE OF IMPROVEMENT IN THE CONSTRUCTION OF WOODEN TRUSS-BLOCKS.

HAVING completed the consideration of the several forms of pads employed by various truss-makers, and their peculiar defects, together with the reasons for giving preference to blocks of firm materials, and especially of wood, it is time to proceed with a description of the several blocks for the treatment of the different kinds of hernia, which have been introduced from the time of EBERLE'S instrument to the introduction of those which it is the object of the present work to illustrate and place before the profession and the public. In doing so I shall avail myself freely of the Report of the Committee of the Philadelphia Medical Society, before alluded to.

No doubt the public are informed of the fact, that MR. STAGNER, of Kentucky, took out a patent in the year 1834, for a truss, provided with a wooden block, a view of which is represented in fig. 13. In 1835, DR. HOOD, also of Kentucky, claimed to have modified this block and to have devised several others; for all of which he obtained a patent. In the specification of the latter gentleman, the first of these is called the "inguinal block;" and the others are termed respectively the "ventro-inguinal, scrotal, and femoral blocks," on the face of the drawings at the Patent Office.

When my attention was first called to the subject of the radical cure of hernia by means of trusses with hard blocks, it struck me that the existing methods were capable of much improvement; and the strong professional and other evidence in favour of the happy results following the use of blocks, of which the forms were but very imperfectly adapted to the anatomy of the parts interested, led me to the belief that those improvements would render the cure of a disease which has been so generally deemed hopeless, both easy and productive of little inconvenience. Much of the evidence alluded to, afterwards proved to have been rather hastily given. Several patients supposed to have been radically cured, suffered afterwards by a relapse: but, if somewhat disappointed in the effects of the instruments previously constructed, I have only had more reason to be pleased with the success of the improvements.

AS MR. STAGNER and DR. HOOD had obtained patents for their trusses, and as it was desirable to avoid all legal difficulties in the prosecution of my observations, I purchased an interest in these patents, and thus originated the association of the names of HOOD and CHASE before the public, in the earlier part of the investigation. The instruments as now improved and recommended in this work, have taken a form so essentially different from those included in the patents of MR. STAGNER and DR. HOOD, that they can no longer be regarded as modifications. The blocks are novel in shape, and cannot be confounded with those of the above-named gentlemen.

After this brief explanation, I shall proceed to notice the blocks intended for the treatment of the

several forms of hernia, making liberal use of the Report of the Committee, which being drawn up with almost unexampled caution, carries with it more weight than the testimony of one directly interested in the result of the argument.

*Of the Common Inguinal Block.*—The inguinal block of STAGNER, seen in fig. 13, is rendered, or rather left somewhat rough, as it comes from the knife, in order that it may produce more irritation in the part on which it presses. This irritation has been thought necessary to a radical cure, by those who first employed such instruments; but this point will be considered in another place: it has nothing to do with the retentive power.

In speaking of the inguinal block of DR. HOOD, the Committee use the following language:

“Your Committee have examined this block with great attention; they can discover no peculiarity in its structure, other than the simple fact that it is rendered smooth. It is the block of STAGNER, with its numerous plane faces pared down into uniform convexity.” Rep. p. 310.\*

Immediately afterwards they express their opinion of its merits:

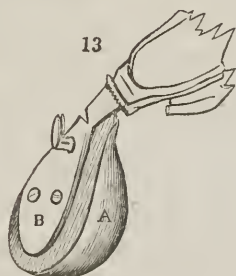
“In examining carefully the mechanical principles involved in the common inguinal blocks of STAGNER and HOOD, these instruments appear to possess one important advantage over the more common forms of the soft pads of trusses in general use; and they are likewise liable to two equally important objec-

\* Since the Report, several of the blocks of MR. STAGNER have fallen into my hands: in some of which the surface is brought down to uniform convexity, but they all retain the general form described by the Committee.



tions. The advantage is found in the gradual arch of the abdominal face of the block; which causes it to adapt itself more regularly than the ellipsoidic pads, to the peculiar form of that part of the abdominal parietes in which the inguinal canal is placed; and in the abruptness of the pelvic face, which enables the instrument to approach more nearly to the pubis without overlapping that bone and occasioning serious inconvenience to the patient, while, at the same time, efficient pressure is effected at the lower end of the block.”

FIG. 13.—STAGNER'S BLOCK WITH ITS ATTACHMENT, AS TAKEN FROM A DRAWING MADE IN THE PATENT OFFICE AT WASHINGTON.



A The block.

B The block-rider.

“The great objections are these:—1st, the tendency to an elongated semi-fusiform shape, renders the block so extremely prominent at the lower extremity of its shoulder or most prominent line, that the remainder of that line produces no very efficient pressure upon the route of the inguinal canal, the principal effect of the instrument being confined to

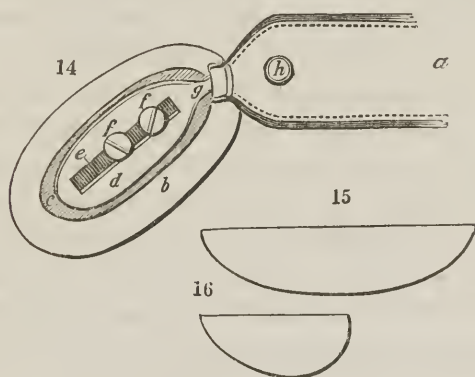
the neighbourhood of the external ring, and the more important point—the internal ring—being left insecurely supported. 2d, the great elevation of the lower end of most of the blocks seen by your Committee, is calculated, in part, to counteract the advantage of the gentle curvature of the abdominal face, by causing the shoulder of the block to act in a linear manner; the strong compression being confined to a very narrow space, as has been proved by cases under the observation of the Committee. This error increases the uncertainty of retention, and it is unnecessary to the production of irritations amply sufficient to fulfil the hypothetical indications pointed out by the inventors—a fact of which your Committee have had, in their opinion, sufficient practical evidence.” Rep. pp. 310, 311.

I will merely add to the remarks of the Committee, that this block lies open to the important objection urged against the pear-shaped pads, in the section on the form of pads. It does not secure the patient sufficiently from concealed hernia occasioned by a protrusion of the intestine into the canal, beneath the upper end of the block. And as all the wooden blocks produce a rapid absorption of the fatty matter under the skin, thus forming for themselves a kind of bed, which fixes them in their proper position, they often bring the skin into close contact with the tendons beneath it. The very prominent and narrow edge of this particular block, then presses with great force on the tendons themselves; and it may be questioned whether this action be free from the danger of producing absorption of the tendons, when the instrument is worn too long, or with too powerful a spring. This is probably the reason why DR. HOOD recommends three blocks of different shapes to be used in succession in the cure of inguinal

hernia ; but that such a proceeding is quite unnecessary when the first block is properly adapted to the form of the parts, has already been proved.

In figures 14, 15, and 16, will be seen a view and sections of my own common inguinal block, on which the Committee have been pleased to make the following comment :

FIG. 14.—CHASE'S COMMON INGUINAL BLOCK, WITH ATTACHMENT.



*a* The extremity of the main-spring of the truss.

*b* The block.

*c* The brass block-rider: the screws by which it is attached being covered by the block-slide.

*d* The block-slide.

*e* The window in the block-slide.

*ff* The two broad-headed screws of the block-adjustment, securing the rider to the slide, and, when loosened, sliding freely in the window.

*g* The soft iron flexible neck, attaching the block-slide to the main-spring.

*h* The button for the pelvic strap, which is generally used for the perineal strap also.

The proper perineal strap-button on the end of the block-slide is omitted in this and some succeeding figures, to prevent confusion.

FIG. 15.—Longitudinal section of the block.

FIG. 16.—Transverse section of the same.

“It will be perceived that these blocks possess all the advantages of the inguinal block of Dr. Hood,

while they escape all the objections urged against that instrument, so far as relates to the true or common inguinal hernia." Rep. p. 313.

Both ends of this block are alike; and while the internal ring is protected as completely as any other part, the pressure is directed equally along the whole length of the abdominal canal; and if it be desired that the external ring should be included in the action, though it is generally unnecessary in this form of hernia, except in very old cases, the object is readily accomplished, by a proper adjustment of the instrument, without any danger of pressure on the os pubis: for this block enjoys all the advantages of the oblique and gently curved abdominal face, with the abrupt pelvic edge mentioned by the Committee in noticing Dr. Hood's block; and its prominent shoulder has no more elevation than is necessary to adapt it properly to the form of the abdomen at the site of the canal. It presses nearly equally at all points, concentrating its force a little at the internal ring and along the route of the canal.

*Of the Ventro-Inguinal Block.*—In ventro-inguinal hernia, and in old common inguinal ruptures, when the internal ring is dilated to such a degree as to correspond entirely, or in part, with the external ring, causing the abdominal canal to disappear, the bowel passes out directly from the abdomen through the external ring; and this passage often becomes enlarged by the constant action of the intestine, until, after reduction, two or even three fingers can be thrust beyond the tendinous walls of the abdomen, carrying the skin before them into the cavity. It is then evident that the form of block used in common inguinal hernia is not adapted to the treatment of this variety. Pressure on the internal ring, or on the route of the abdominal canal, is not

requisite in this instance, and the block should be constructed so as to act mainly on the external ring, so called. But this ring is in fact a triangle, with the brim of the pelvis, or the edge of the pubic bone forming one of its sides. In order, then, to prevent all danger of dilation, the block must be large; and, for the purpose of completely covering the ring, it must approach as nearly as possible to the brim of the pelvis.

DR. HOOD had two contrivances for this purpose, one of which he called his ventro-inguinal block, and the other his scrotal block. In the Report of the Committee they are both called ventro-inguinal blocks.

The first of these was decidedly condemned by the Committee. It is concave on its pressing surface, and is liable to the censure passed upon all the concave pads, in the section on forms. The second is by far the best of the blocks mentioned in DR. HOOD's specification. It is seen with its sections in figs. 17, 18, and 19.

FIG. 17.—HOOD'S VENTRO-INGUINAL BLOCK.

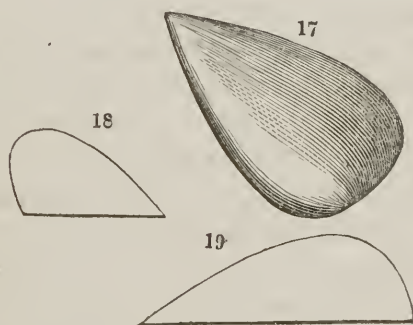


FIG. 18.—Transverse section.

FIG. 19.—Longitudinal section.

Until after the Report of the Committee, I had not completed my own ventro-inguinal block, and I employ-



ed this contrivance, considerably modified, in all bad cases of ventro-inginal rupture—though, in many instances, my common inguinal block was used.

In relation to this contrivance, the Committee make the following remarks.

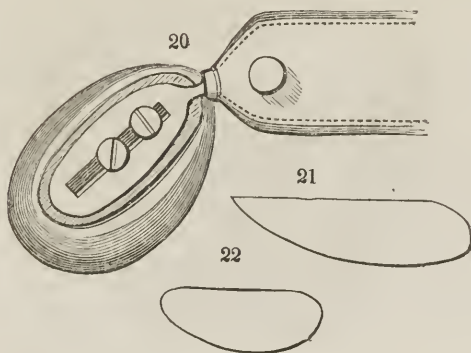
“The best idea of the peculiar form of this block is conveyed by supposing the upper surface of the common soft pad of an ordinary truss, (i. e. the pad of the common truss, fig. 4, p. 45) to be compressed until it be made to overhang its base upon the lower or outer side, and also at its lower or inner extremity. This compression widens the lower part of the pad and diminishes its thickness; thus in part removing the objections against the common” (Hood’s) “inguinal block.”—(Rep. p. 311.)

Trusses with this block possess a retentive power superior to any instruments that were previously used in ventro-inginal hernia, yet they often fail in preventing a protrusion, and they do not act with sufficient certainty to warrant any hope of radical cure in this variety of rupture.

The block which I now employ in all cases of ventro-inginal and very old common inguinal herniæ which have become direct by producing a partial or complete correspondence of the two abdominal rings, is represented, with its sections in figs. 20, 21, and 22, and it is shown *in situ*, in fig. 23, with an outline of the pelvis, to illustrate the perfect and safe manner in which it adapts itself to the edge of the os pubis at the place where the external ring is found. I cannot do better in explaining the character of this block which was contrived since the Report of the Committee was written, than by quoting the following remarks of DR. REYNELL COATES, in a note published under the head

of American Intelligence in the same Journal that contains the Report.

FIG. 20.—CHASE'S VENTRO-INGUINAL BLOCK.



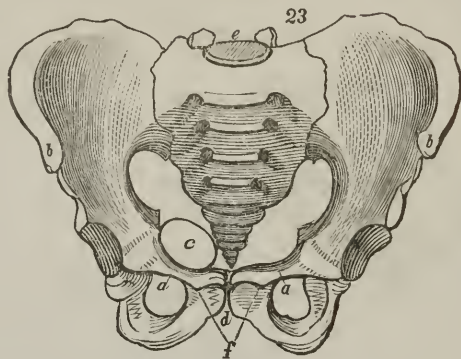
The attachments being in all respects similar to that in fig. 14, no references are required.

FIG. 21.—Longitudinal section of the block.

FIG. 22.—Transverse section.

“The first of these, which may be denominated CHASE’S ventro-inguinal block, resembles the common inguinal block (Chase’s), strongly compressed upon its broader convexity, so as to overhang the base to a great extent, particularly in the middle of the length of the block; so that when the block is placed on its base and viewed perpendicularly, it presents, on one margin, a semi-elliptical curvature, and on the other, an effuse parabola. This form permits the effective pressure of the block to act very near the brim of the pelvis, without injuring the spermatic cord, or contusing the integuments against the bone; and it would appear difficult to contrive a form of pad better fitted to secure the retention of the bowel in this very troublesome variety of hernia.” *Am. Jr. of Med. Sciences*, vol. 12, p. 543.

FIG. 23.—A VIEW OF THE PELVIS, WITH CHASE'S VENTRO-INGUINAL BLOCK IN SITU—TO SHOW THE ADAPTATION OF ITS CURVATURE TO THE FORM OF THE BODY AND SPINE OF THE OS PUBIS.



- a a* The bodies of the pubic bones.
- b b* The anterior superior spinous processes of the ilia.
- c* The ventro-inguinal block in situ.
- d* The symphysis pubis,
- e* The base of the sacrum.
- f* The spines of the pubic bones.

I have, since that period, had the opportunity of testing this block in many very obstinate and difficult cases of ventro-inguinal hernia, and have never failed in producing the most perfect retention, without inconvenience to the patient. Many instances of this kind have been witnessed by the members of the committee, and other surgeons of this city.

*Of the Femoral Block.*—At the time of the Report of the Committee, the instruments for femoral hernia were also very imperfect. The subject of femoral pads appears to have been totally neglected by surgeons, prior to the year 1835. DR. HOOD's femoral block was unequivocally condemned by the Committee, in the following passage of their Report.

“Its chief design, however, was to produce a closure of the femoral ring, an effect which, in the opinion of your Committee, cannot result from such an instrument, owing to the peculiar relation existing between the edges of Poupart’s and Gimbernat’s ligaments. Your Committee feel compelled to disapprove of this pad,” (block) “as uncertain in retentive power, and necessarily extremely annoying to the patient.”

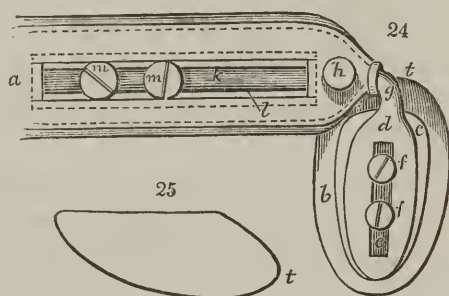
“This ground is taken on plain mechanical principles, and does not appear to require the test of experiment. But if evidence of this character be demanded, it can be given by one of the most ingenious members of the society, who has actually and faithfully employed it.”—Rep. p. 311, 312.

It is unnecessary to give a figure of this block here, but those who wish to know anything more of its peculiarities will find it figured in the plate which accompanies the Report.

In the earlier part of the investigation, I employed, in femoral hernia, a small block of the same form with my common inguinal block, but it is obvious from the remarks made in the section on the Form of Pads or Blocks, and from the tenor of the Report of the Committee, that further improvement was necessary in the treatment of this kind of rupture. The block just mentioned produced a more constant and perfect retention of the intestine than any instrument that had been previously employed, but its pressure could not easily be directed exactly upwards, nor could its shoulder be depressed so as to act beneath the edge of Poupart’s ligament. I therefore constructed the block represented with its section in figs. 24 and 25, which is designed to be worn with the thick end upwards. As absorption goes on under its pressure, the rounded and overhanging promontory of the upper

extremity sinks beneath the level of Poupart's ligament, and giving firm support to the cellular tissue which fills the femoral ring, opposes to the protrusion a force much more efficient than that of any other pad or block yet offered to the public, because its direction is exactly opposite to that pursued by the intestine during its descent.

FIG. 24.—CHASE'S FEMORAL BLOCK WITH ATTACHMENT.



The letters from *a* to *h*, inclusive, have the same reference as in fig. 14.

*k* A window in the anterior extremity of the main-spring.

*l* The iron neck of the block-slide, continued along the main-spring for some inches and seen through the window *k*.

*m m* Two broad-headed screws of the spring adjustment, securing the flattened extremity of the iron neck to the main-spring, and, when loose, permitting it to slide on the main-spring.

FIG. 25. A longitudinal section of the femoral block.

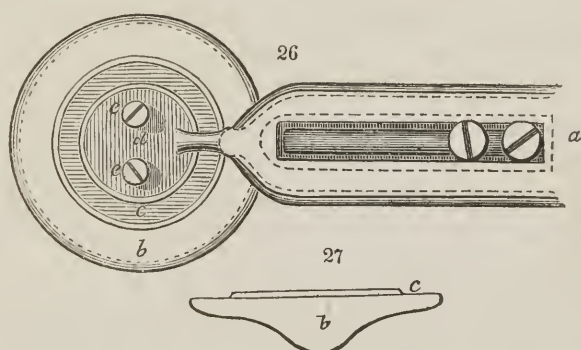
The inclined plane of the block extending down the thigh, assists the main-spring in preventing it from being pushed down from its proper position; and the small dimensions of the block free it from all danger of interference with the muscles of the thigh, so that it cannot be displaced by their motions. This contrivance has been found to answer the purpose in view; by securing perfect retention and effecting the radical



cure of femoral hernia, which is by far the most embarrassing and dangerous form of the disease.

*Of the Umbilical Block.*—Almost all possible forms of circular disks have been employed in the treatment of umbilical hernia, and as the disease is so uncertain in extent, and the part of the abdomen where it appears, so various in shape in different individuals, it would be impossible to contrive a model applicable in all instances. In those rare cases in which the deficiency of the tendinous walls of the abdomen from arrest of development is very great, the skill of the surgeon is called upon for extempore invention. In figs. 26 and 27, I have

FIG. 26.—CHASE'S UMBILICAL BLOCK AND ATTACHMENT.



*a* The anterior end of the spring, with the same kind of spring attachment as in the femoral truss.

*b* The circular block.

*c* The circular block-rider.

*d* The circular iron disk supporting the block-rider.

*e e* Two button-headed screws attaching the rider to the disk, and serving at the same time to secure the strap.

FIG. 27.—Section of the circular block.

represented the form which, with slight modifications is applicable in ninety-nine cases of a hundred. The central eminence requires to be pretty accurately adapted

to the form of the depression at the navel, and it is therefore proper that the surgeon should be provided with a considerable number of blocks in order to be always prepared for the peculiar wants of individuals.


The same necessity for a central eminence to enable the apparatus to represent the deficient portion of the tendons in a perfectly natural manner, renders umbilical hernia an apparent exception to the general rule laid down in the former chapter of the work, viz. that when one block is properly adapted to the anatomical relations of the parts, *for that very reason* another cannot be so ; but the exception is not a real one. When an umbilical block is applied on a fat patient, and when great absorption of the fat takes place under the pressure, the wide portion of the block may sink in to a considerable extent, permitting the smaller central eminence to act as a distending force upon the herniary opening. In this case the anatomical relations of the parts are changed, and with them the adaptation of the block, which may require to be replaced by a less prominent one. The same necessity never exists in the other forms of rupture.

According to the order of arrangement observed at the commencement of the present chapter, I should now take up the consideration of the accessory parts of trusses ; but to avoid repetition, it is better to notice them when describing the complete set of instruments as now offered to the public.

## CHAPTER VI.

### ON COMPLETE TRUSSES.

THE reader is by this time prepared to take up the consideration of the several forms of trusses which are now offered to the public, with a clear understanding of their pretensions and merits. They stand upon their own just claims, and the Medical Profession being the only competent tribunal, is constituted their sole judge. Far be it from my wishes to enlist in their favour the prejudices of the vulgar, or the arts of the empiric.



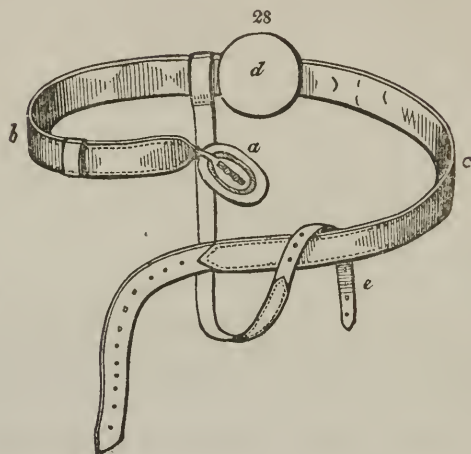
### SECTION 1.

#### OF THE INGUINAL TRUSS.

The first of these instruments which will be introduced to the notice of the profession, is the common inguinal truss, adapted to the most frequent form of rupture. Represented in fig. 28.

The spring of this truss, like that of the femoral truss, extends round the back and the ilium of the side opposite the hernia, as far as the anterior superior spinous process of that bone. It is not bent to correspond with the form of the back precisely, as is advised by MR. SAMUEL COOPER, because this would require that each patient should be separately measured, and a special truss made for him, before the treatment could be at-

FIG. 28.—CHASE'S COMMON INGUINAL TRUSS FOR THE RIGHT SIDE.



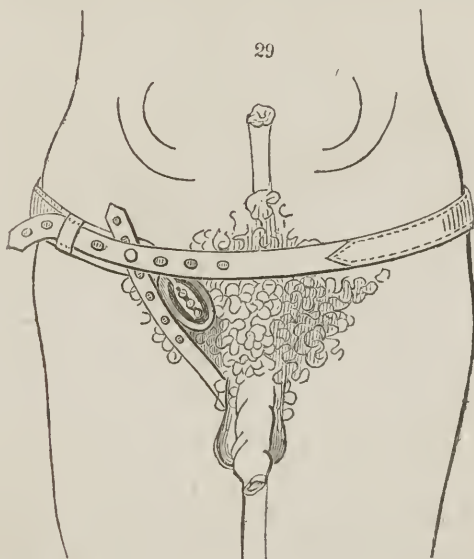
- a* The block and block attachment.
- b* The part of the spring which bears the greatest stress and requires the highest temper.
- c* The termination of the spring, made more flexible, and extending to the edge of the os ilium between the two spinous processes on the opposite side of the body.
- d* The back pad seen in situ.
- e* The perineal strap with its end thrown round the extremity of the spring cover.

tempted. The difficulty of getting the precise form would be so great as to embarrass the surgeon constantly—nor is it at all necessary—for with the regular spiral curvature represented in the figure, and the back-pad seen attached to the instrument, the spring sits upon the patient with perfect ease and steadiness: and the most sudden and violent motions of the body do not disturb it in the least.

The anterior end of the spring is curved gently downwards so as to bring it nearer to the abdominal canal; but this inclination cannot be carried very far without

making the instrument unsteady. Attached to this end of the spring is an iron block-slide; represented in fig. 14, p. 77, a long oval plate, with a mortise or narrow window (*e*,) running nearly its whole length, in order to allow the block to be adjusted with ease and nicety. This plate is connected with the spring by means of a narrow neck of soft iron (*g*) which can be bent in any direction so as to adapt the block to the degree of prominence or rotundity in the abdomen of particular patients.

FIG. 29.—CHASE'S COMMON INGUINAL TRUSS APPLIED.

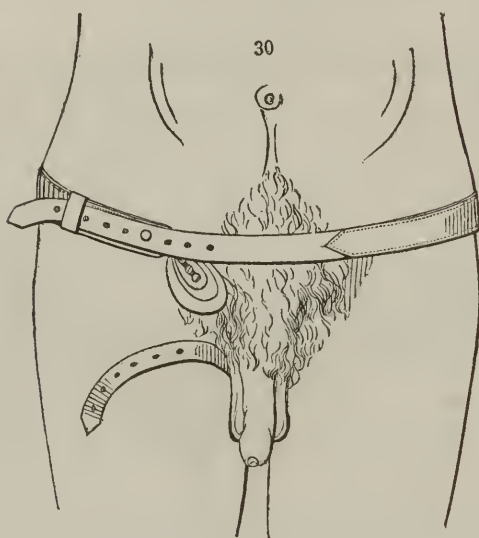


This neck is also necessary to accommodate the truss to the varieties of the disease for which it is intended—for the same instrument may be employed either in common inguinal or in ventro-ingual hernia. In the former, the oval plate is placed at an angle of about 135 degrees or even more, that being the position which brings the long diameter of the common inguinal block to corres-



pond in direction with the abdominal canal, but in the ventro-inguinal variety the plate should form a smaller angle, so as to approach nearer to the perpendicular, in order to bring the ventro-inguinal block close to the edge of the os pubis.

FIG. 30.—CHASE'S VENTRO-INGUINAL TRUSS APPLIED, THE PERINEAL STRAP BEING UNBUTTONED AND THROWN BACK.



Blocks of any required shape may be attached to one of these trusses, and changed at pleasure without delay.

The mode of attachment is made in the following manner: Each block is surmounted by a block-rider, an oval plate a little wider than the block-slide; (fig. 14, p. 77, *c.*) the rider is secured to the block by three screws properly counter-sunk; and it is likewise secured to the block-slide by two broad-headed screws (*ff*) passing through the window of the latter, which, when loose,

permit the block and rider to glide freely under the slide, but when tightened, render them immoveable.

The back-pad is a simple circular disk of metal, covered with buckskin or some woollen fabric. By its breadth and the pressure of the truss upon it, the instrument is rendered extremely secure; but it does not answer to fix this pad immoveably to the spring; for, not unfrequently it causes absorption or irritation by its warmth and closeness, if it remain too long on the same spot. It ought generally to be placed on the middle of the back of the sacrum; but when it renders the patient uncomfortable, it may be carried a little to either side for a day or two, and then returned. To facilitate this, the back-pad is simply attached by a leather loop, which slides freely over the spring-cover.

It has generally been customary to fix the pelvic straps of those trusses which are provided with them, to a button placed on the back of the pad; but this method causes the strap to take a very oblique direction downwards, and, consequently, it has a strong tendency to draw the pad upwards, which, if not counteracted by the thigh or perineal strap, paves the way for a descent of the intestine. Instead, then, of securing this strap of my inguinal trusses to the block or block-slide, I fasten it to a button on the anterior extremity of the spring, (*h*,) so that when applied, the strap and spring-cover surround the pelvis on nearly a level line. The surplus portion of the strap is carefully secured by being passed through loops of leather on the outside of the spring-cover. The perineal strap is generally secured to the same button with the pelvic strap; but occasionally, (more especially in ventro-inguinal hernia,) it is better to

attach it to a button on the lower extremity of the block-slide.

These remarks will give the reader a very good idea of the character and mode of application of the truss for an inguinal rupture and its several varieties.

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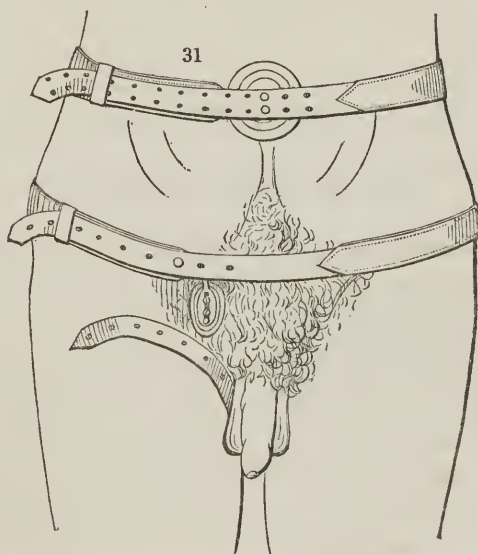
## SECTION 2.

### OF THE FEMORAL TRUSS.

The parts about femoral hernia differ much more widely in their relative position in individuals than those which are the seat of inguinal hernia, being higher or lower, nearer to, or farther from the symphysis pubis, according to circumstances somewhat less fixed than those which determine the position of the abdominal canal. But it is even more necessary to be precise in adjusting the block in this most troublesome species of the disease; and the difficulty is increased by the small dimensions of the block. For many of the peculiarities of the femoral truss the reader is referred back to fig. 24, p. 84, where they are distinctly seen. The instrument applied is seen in fig. 31. The spring has precisely the same form and curvature with that of the inguinal truss; but at its anterior end is a long narrow window or slit, seen in fig. 24, (*k*) and intended for a slide. The block-slide plate (*d*) is attached by a long iron neck, (*gl*) instead of the short one seen in the last instrument; and this, instead of being welded to the spring, extends along the window or slit, (*k*) where it is

connected with the spring by the two adjusting screws (*mm*), precisely in the same manner with the block and rider. The neck of the plate is bent at right angles near the block, and the angle is made soft. The remainder of the attachment is similar to that used in the inguinal trusses. The instrument is thus provided with a double adjustment, and the block can be most accurately adapted to the position of the neck of the sac, in persons whose pelves differ very widely from each other in form. The same instrument may be employed in the treatment of patients of either sex.

FIG. 31.—CHASE'S FEMORAL AND UMBILICAL TRUSSES, APPLIED.



The main-spring is fixed as in the inguinal truss; but the perineal band or thigh-strap is attached to a button, seen in fig. 31, on the block-slide. The femoral ring being located much lower than

the parts interested in inguinal hernia, I had endeavoured to accommodate the instrument to this position, by giving its anterior extremity a much greater curvature downwards; but this was found to destroy the steadiness of the instrument, and the position required for the block is now obtained chiefly by means of the long rectangular neck of the block-slide, and the above-mentioned double adjustment; but the distance between the block and the spring necessarily renders the former a little less secure from changing its place; and for this reason the perineal band is attached to the block-slide instead of the spring.

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### SECTION 3.

#### OF THE UMBILICAL TRUSS.

A few words on the peculiarities of the umbilical truss, represented as applied in fig. 31, p. 93, will complete the subject of single instruments.

In this truss, the circular block (see fig. 26, p. 85,) is attached to a circular brass rider; (fig. 26, *c.*) and the rider is permanently fixed to a smaller circle of polished iron, (*d*) which is here substituted for the block slide of the inguinal truss, because no adjusting movement in the perpendicular direction is required in this species of hernia. The connexion between the rider and the iron disk is effected by two screws, (*ee*) which fit all instruments alike; they are elongated and furnished with round heads so as to act as buttons for the



strap of the truss ; the screws are placed one perpendicularly over the other, and correspond to a double row of eyelet holes in the strap.

The anterior end of the spring is not bent downwards as in other trusses, but its whole curvature lies in the same horizontal plane ; the posterior or long limb of the spring extends past the spine and as far as the middle of the opposite side of the body.

The only adjusting movement of the pad required in this instrument to fit it to the actual dimensions of the pelvis, is that in the longitudinal direction, for all other requisites are fulfilled by the selection of a proper block. This adjustment is accomplished by means of the long neck of the iron disk which is attached to the spring by screws playing in the window seen in the anterior part of the spring, in the manner described under the head of the femoral truss.

The back pad of this instrument is made large and oblong ; being slightly curved to accommodate it to the form of the back, and it rides over the spring cover by means of two leather loops instead of one, to prevent it from turning with the accidental movements of the body or the friction of the dress.

This apparatus fits very perfectly and is worn with great comfort, even in early infancy, but it may require the aid of scapularies more frequently than either of the other trusses.

## SECTION 4.

## OF THE DOUBLE TRUSS.

The formation of a good double truss is the most difficult problem in the whole field of the treatment of hernia by instruments ; those heretofore employed have generally been made immoveable behind, surrounding the pelvis in the form of a single hoop.

But there is often a difference between the two sides of the pelvis, so that if one half of the instrument be properly adapted to one side, the other half cannot be made to correspond with it in its position. It very often happens in double inguinal hernia, that the rupture on one side is of the common inguinal variety, while on the other it is ventro-ingual, so that one block or pad requires to be carried lower than the other, by means of the block-slide or by the adjustment of the perineal straps ; but in the common double trusses, one pad cannot be drawn down without the other, except by tilting the instrument to one side, which entirely destroys the accuracy and permanency of its adjustment.

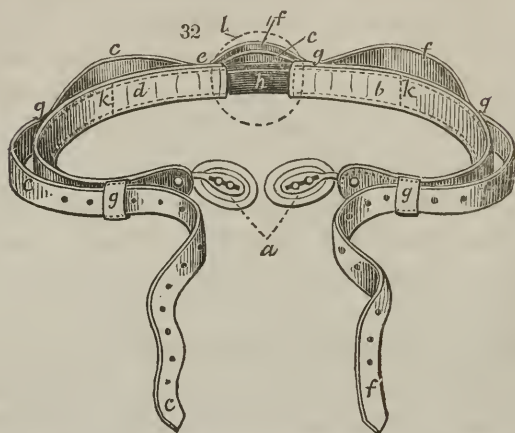
This difficulty is much greater when the rupture is inguinal on one side and femoral on the other ; but even when both sides are uniform, and the ruptures of the same kind, there are still two great objections against such double trusses. A single instrument will fit several different individuals of nearly the same size, because the end of the spring, by sliding a little farther round or stopping a little short on the opposite side of the pelvis, behind the patient, adapts itself very perfectly to slight differences of circumference ; but if the double truss does not fit with the utmost accuracy, it cannot be

rendered at all steady or secure in its action ; and the surgeon in an extensive practice would require almost as many instruments as he received cases. The risk of accidental derangement of the pads is also twofold in these double trusses, for if one of the pads be forced up by a propulsion of the bowel, or by accidental carelessness, the other must follow its motions.

These difficulties have induced many to reject the double truss altogether, and to substitute two single trusses in double hernia. This plan I followed myself until within a few months, with very good success, but the winding of the springs round each other on the back, and the crossing of the straps in front, rendered the apparatus clumsy and somewhat uncomfortable, and it was with a feeling of great pleasure that I at last succeeded in contriving the instrument which is represented in fig. 32. This may be termed a double truss; for when applied it is impossible to perceive that there are two springs instead of one ; but in fact it is composed of two single trusses which are so combined as to be adapted severally to any varieties of hernia occurring in the inguinal and femoral region, in all their complications ; each truss has its proper spring, and the two springs slide over each other so as to give support to each and to make them act as one.

The spring covers on each side stop at the middle line of the body, and the end of each receives the opposite spring, but does not bind it so tightly as to prevent one block from being adapted to one variety of hernia, while the other is adjusted to a different variety. The straps are continued on each side from the posterior ends of the spring covers, but one of them passes through a loop at the beginning of the other, so that they do not cross each other on their route, and when applied, they

FIG. 32.—CHASE'S DOUBLE TRUSS—PREPARED FOR A DOUBLE COMMON INGUINAL HERNIA.



*a* The two common inguinal blocks with their attachments.

*b* The spring cover of the left truss terminating in the strap *c c c c*.

*c c c c* The pelvic strap of the left truss, thrown into loops, and passing through an opening beneath the base of the attachment of the strap on the right side at *e*, like the flexor tendons of the last phalanx of the fingers through the terminations of those of the second phalanx.

*d* The spring cover of the right truss terminating in the strap *f f f f*

*e* The site of the commencement of the pelvic strap of the right truss, secured by the edges to the spring cover, but permitting the left pelvic strap to pass up from under its base so as to become superficial in the rest of its course; this arrangement being concealed by the instrument.

*f f f f* The pelvic strap of the right truss thrown into loops.

*g g g g g* Loops confining each pelvic strap respectively to the spring cover of the opposite truss.

*h* The two springs seen one behind the other, and naked, between the ends of the spring covers.

*k k* Dotted lines representing the spots where the spring of each truss terminates within the spring cover of its fellow.

*l* A dotted line representing the proper position for the back pad.

look like a single strap and the whole apparatus appears to be a single truss. By drawing the springs out a little, the instrument is adapted to a large figure, and by tightening the two straps it is contracted so as to accommodate itself to patients varying considerably in size.

Six different sizes have been found sufficient for all the cases that have presented themselves, and the perfect comfort and security of the truss induces me to consider this one of the most perfect of all the instruments.

If one rupture be common inguinal and the other ventro-ingual, the only difference between the two sides of the apparatus is found in the block; but if one be femoral and the other inguinal, one side has the single and the other the double adjustment, as seen in the figures of the corresponding single trusses.

In concluding the subject of double trusses, I shall just pause to notice a popular error which has led to the introduction of a double truss for single hernia that has been patented, but is rather roughly handled in the *Journal of the Franklin Institute*.—"It is assumed by the patentee, that if pressure is made on one side only, this pressure tends to rupture the opposite side; an opinion not at all sustained by experience, or founded in reason." Vol. 14, p. 335. 1835. The instrument is very complex; but if the general principles given in the chapter on the Form of Trusses be correct, the objections against it are too obvious to require further comment.

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## SECTION 5.

### OF THE BATHING TRUSS AND THE NIGHT BELT.

As cleanliness of person and the enjoyment of the luxury of bathing, require the patient to expose his instrument to moisture, which would be extremely



uncomfortable under any circumstances, but particularly if he employed the instruments as generally constructed: and as salt water would rapidly destroy the spring cover, I have been induced to prepare a set of trusses expressly for bathing.

These instruments are covered with India rubber cloth. The prepared or varnished side is turned towards the spring of the instrument, in order to prevent any irritation of the skin by the action of the rubber.

During the warm season in this and more southern latitudes, instruments constructed in this manner will be found preferable to those covered in the common way.

No person, while under treatment for hernia, should visit the sea-shore or attempt to bathe without one of these instruments, which should be applied and removed agreeably to the rules before laid down.

*Of the Night Belt.*—Much has been said by writers on hernia, of the necessity of a night belt to be worn when the truss is removed. There are some patients whose bowel cannot be retained without a strong spring during the day, but who suffer from the pressure during the night, when the support derived from the gravity of the bowels is removed. It is much better to employ at night a truss with a weaker spring, than to trust to so imperfect an instrument as a belt; but if the latter be employed at all, it is indispensable that it should be provided with a block similar to that of the truss, secured by a perineal strap. When every precaution is used, it is still uncertain in its action, and the more complex inventions of this kind are very inferior to the simplest.

## CHAPTER VII.

### ON THE MODUS OPERANDI OF THE INSTRUMENTS FOR THE RADICAL CURE OF HERNIA.

FROM the date of the earliest surgical records to the present time, various plans have been proposed for the radical cure of hernia, by operations with the knife; and some accidental cures have taken place from different causes, as, for instance, in consequence of the adhesion of a portion of omentum to the herniary orifice,—by the discharge of omentum from an abscess after strangulation, (*See DR. YARDLEY'S case in PARRISH, on Hernia and Diseases of the Urinary Organs, p. 166,*)—by mal-position and adhesion of the testicle in the abdominal canal, by sloughing of the sac, (*See DR. J. R. BARTON'S case, in KIRKBRIDE'S Clinical Reports, Am. Journ. of Med. Vol. 15, p. 342*)—or by the separation of a portion of sphacelated omentum, after operation, and the adhesion of the ulcerated surface to the ring, (*See the several general treatises on Hernia.*) Sometimes the ordinary operation for strangulated hernia has been followed by a radical cure, probably in consequence of unusual inflammation about the ring. MR. S. COOPER quotes a case from RICHTER, in which “he saw the pad of a non-elastic bandage excite, in the region of the abdominal ring a considerable inflammation, which terminated after a few days in suppuration. The hernia never appeared again after the cure of the abscess.” *Surg. Dic. Art. Hernia.*

The punctum aureum, castration, the golden stitch, and other ancient operations, together with several more modern plans, such as tying the neck and cutting away the body of the sac in inguinal hernia, all of which are now discarded, were predicated upon the belief that the production of adhesion at the neck of the sac would radically cure the disease; and the evidence derived from the accidental cases above-mentioned is sufficient to show the plausibility of the idea, though the danger of such serious operations has very properly led to their general rejection. The radical cure of umbilical hernia has been effected in children by tying the neck of the sac, including the integuments in the ligature in some cases. **DESSAULT** succeeded in nine cases by this operation. It has been performed once in this city by **DR. PARRISH**. The practice is not generally recommended, because the chances of cure in infancy are too good to warrant a resort to such dangerous and painful measures. **RICHTER** was very successful by scarifying the neck of the sac to promote its adhesion.

The possibility of radical cure by the production of severe inflammation about the neck of the sac, seems to be well established by the evidence just given; but in regard to the propriety of attempting this by operation with the knife or ligature, I will quote the following passage from **MR. S. COOPER**:

“From the account, however, which has been given of the anatomy of the bubonocoele, it is obvious that none of these methods could do more than obliterate the sac as high as the ring, and never, that part of it which is within the inguinal canal. Hence

the neck of the sac must still remain open for the descent of the viscera. This consideration, and that of the chances of bad and fatal symptoms from any operation undertaken solely for this purpose, and not urgently required for the relief of strangulation, are the grounds on which these experiments are now disapproved." *Surg. Dict. Art. Hernia*. Still, however, the idea of producing radical cures by inflammation has never been entirely abandoned, although the use of the knife for this purpose is generally condemned.

MR. BEAUMONT, a truss-maker of Lyons, claimed to have succeeded, according to TAVERNIER, in curing all kinds of hernia by means of the local application of stimulants and astringents applied beneath the trusses; which practice he pursued for more than twenty years. (TAVERNIER'S *Elements of Operative Surgery. Translated by GROSS.* p. 286.) And a similar mode of treatment has since been recommended, from time to time, both in England and on the Continent.

The *modus operandi* of these applications, as described by those who recommend them, consists in the provocation of a certain degree of adhesive inflammation and contraction of the ring, by means of the irritation produced by the astringents or other stimulants; the contraction and inflammation are supposed to diminish the size of the ring, and finally to obliterate it. But it should be remembered, that trusses, and, in most cases, confinement for a long time in a recumbent posture, were employed during the use of these remedies. It is also mentioned by several surgical writers, that cases of cure have resulted from long confinement in sickness, without the

assistance of any bandage or truss. Umbilical hernia has been cured, in early infancy, by simply directing the nurse to place her hand over the part to prevent the bowel from protruding when the child cried, and prescribing a proper attention to the state of the bowels.

It has been already mentioned that other herniæ are occasionally cured at a later period, by the use of almost any of the trusses. It would therefore appear from the foregoing remarks, that any mode of treatment which secures the retention of the bowel, may effect a radical cure even without the help of local irritation and the peculiar state of inflammation produced by astringents, stimulants, or surgical operations.

But the slightest examination into the writings of the most eminent surgeons will be sufficient to convince the reader that there is very little dependence to be placed in the retentive power of any of the trusses now in general use as a means of radical cure, unless in cases of young children.

The sweeping denunciations uttered by PERCIVAL POTT, against those who pretend to accomplish this desirable object by mechanical contrivances, are scarcely weakened by the faint hopes of occasional success to be found in the works of LAWRENCE, RICHTER, SIR A. COOPER, DORSEY, &c., and the mechanical treatment of Rupture, as prescribed by the most experienced men in the profession, may be summed up in the pithy sentence of ABERNETHY.

“You return it,” (the bowel); “put a truss on it and keep it on.”

Some of those who employ astringent applications, boast of greater success; but if the results which they report had been fully borne out by further experience,



it is very improbable that the disease would have continued to be regarded so hopeless in character. My first attempts at radical cure were made upon this plan, several years before I undertook the improvement of the form of trusses, and I have occasionally employed astringents more recently, to test their effects as adjuvants to the pressure of the improved instruments. They have not accomplished their purpose when used with a common truss, but I think they have sometimes hastened the cure when the best instruments have been employed. The greatest objection to this application, is the necessity of frequently removing the truss to enable the surgeon to reach the spot on which they must be applied, a difficulty that seems more than equivalent to the advantage gained.

When Mr. STAGNER first introduced his wooden block, he is said to have attributed its good effect to the irritation and adhesive inflammation which it caused about the part. Dr. HOOD, and most or all of those who have noticed his method of treatment have adopted the opinion that the pressure of the instrument produces adhesive inflammation in all the parts between the peritoneum and the skin, consolidating them and completely obliterating the herniary opening.

In my own practice, the pressure of the instrument produces some redness of the skin in a great majority of cases, until the parts become accustomed to it; and occasionally there is so much irritation during the first few days that the patient complains of some soreness. But radical cure has been effected in several cases in which there has been scarcely a trace of irritation at any time during the treatment.

It is plain, then, that it would be rather premature in me to attempt to decide, at present, how much the pro-

duction of local irritation accelerates the radical cure, in the treatment of hernia by wooden blocks; but as constant inquiries are made for a decision on this subject, particularly by surgeons at a distance, it is proper to throw before the public the opinion of those who, as disinterested observers, have enjoyed superior opportunities for arriving at just conclusions.

In that portion of the Report of the Committee which bears upon this question, they have declared that any considerable irritation produced in the part by the pressure of a block, then appeared to them a matter "of secondary importance," so far as the chances of radical cure were involved; but as the degree and extent of that importance was not discussed, and as many surgeons have expressed a strong desire to know how far the irritation was to be relied upon as a means of assisting or accelerating the cure, I addressed the following note to the Chairman of the Committee, the reply to which is now published by permission.

*Dear Sir,*

DRS. \* \* \* \* and \* \* \*, and several surgeons at a distance, have at different times inquired of me, what opinion the Committee on the Radical cure of Hernia entertained, as to the action and the proper extent of irritation required to cause the herniary opening to close up firmly, and produce a permanent cure. From the slight notice taken of this subject in the preliminary Report, some have supposed that the Committee considered the irritation altogether unnecessary, and attributed the cure entirely to the perfect retention of the bowel by the truss. Others, who are inclined to place great confidence in the adhesion of the mouth of the sac, or in the consolidation of all the parts by the adhesive inflammation, only understand the Committee to mean that a comparatively slight degree of irritation is sufficient, and that the perfect retention is much more important, though both are necessary. As the members of the Committee, and especially yourself, have seen much additional evidence individually since the Report was published, and as I am about to produce a work on the subject in the

course of a few weeks, you would oblige me by giving me some further notice of the opinions of the Committee on the *modus operandi* of my instruments. The remarks will come with more force from them than from one directly interested in the question. If the Committee are not at present engaged in pursuing their investigations on this branch of their subject, perhaps you would indulge me with your own views on the question. In either case you will confer an obligation on

Yours, very respectfully,

HEBER CHASE.

REYNELL COATES, M. D.,

*Chairman of the Committee of Surgery.*

To this note DR. COATES returned the following elaborate reply :

*My Dear Sir,*

Your note of the 26th inst. has received early attention. The Committee are not at present in session, and the individual engagements of the members would render it difficult for them to comply with your wish, in time, even if it were proper for them to address official opinions upon any matter connected with the subject of their investigations, to any party other than the society of which they are the organ. From this you will at once perceive the impossibility of a compliance with the first request contained in your note, and also, the delicacy required in venturing upon a statement of my own views on the subject, while officially associated with the other gentlemen of the Committee. But, as your inquiry relates to a theoretical question in pathology, connected only indirectly with the labours of the Committee, which are confined, as strictly as possible, to the accumulation of facts, I will not refuse to express such opinions, as to the cause of the radical cure of hernia by trusses, as appear to be fairly deducible from well-known data, embracing in the argument the published opinions of the Committee, and the facts which have fallen under my own notice since the Report was read; but these opinions are made upon personal responsibility, and must not be received as emanating from the Committee.

From the tenor of your note, the subject of your inquiry seems to be included in two questions—first, *what causes the occlusion of the hernial orifice, in cases of radical cure?* and, secondly—*if local ir-*

*ritation and inflammation are not the sole causes of this occlusion, what is their value as auxiliaries in the treatment?*

It is very evident from the whole bearing of the eighth section of the preliminary Report, that the Committee did not regard the production of local irritation *by mechanical pressure*, as the fundamental cause of the occlusion of the orifice; and they have cautiously avoided any decided expression of sentiment as to the extent to which such irritation may be employed therapeutically, as an adjuvant to the physiological process by which all false passages tend to obliterate themselves. From the ample opportunities of observation with which you have favoured me since the time of the Report, I have discovered no fact calculated to enhance my own estimate of the importance of the local irritation. As to adhesive inflammation, or to speak more properly, *adhesion*, strong reasons may be adduced to show, that if it should occur, it is not likely to accelerate the cure. It must be remembered that there is a wide difference between *adhesion* in internal parts, which results from the organized and permanent agglutination of those parts, and that kind of *callosity* which results from the interstitial deposit of a substance perhaps analogous to the matter of unorganized false membrane, and which, though often very permanent, is always liable to re-absorption, at least when located in cellular parts. Both these changes may and actually do take place in hernia, and both are the result of irritation if this word be taken in a physiological, and not a pathological sense.

The seats of these changes are the peritoneum forming the neck of the sac, and the portions of cellular tissue which naturally occupy the canal or orifice through which the sac is forced; and, at a later period, the neighbouring fasciæ, or the edges of the surrounding tendons become involved.

Now, if the cellular contents of the passage be condensed by *simple adhesion*, it is obvious that the matter actually occupying the passage, must be diminished in bulk by the disappearance of the serosity of the tissue. If, under such circumstances, the neck of the sac itself should not be obliterated by adhesion at the time that this condensation takes place, it is perfectly clear that the diminished volume of the contents of the passage actually tends to lessen the resistance to the exit of the bowel, or, in other words, to keep the neck of the sac in a state of more constant dilation. When the most perfect retention is effected by means of a truss, the patient, on the removal of the instrument, is thus rendered even less secure than before the treatment commenced.

But the Committee have expressed an opinion which is fully confirmed by the whole history of hernia, namely, that the serous membrane of the hernial sac "never loses its peculiar tendency to adhesion under slight irritations." That the pressure of truss pads, whether soft or hard, may produce sufficient irritation to cause adhesion in the neck of the sac, there can be no question, and there is also little doubt that wooden blocks will produce this effect more frequently than soft pads, in consequence of the decided absorption of the subcutaneous cellular tissue which they occasion, and the power thence derived of transmitting the superficial irritation, which may be carried to any extent, directly to the parts which occupy and surround the hernial orifice; a power which renders the apparatus of some inventors highly dangerous, and confines the proper use of others to those who are well trained in the practice of surgery, for if the superficial irritation be carried so far as to produce a pathological condition of the parts immediately over the peritoneum *there can be no certainty that it will not involve the peritoneum in general.* I will venture still further, and admit that the pressure of a wooden block may very possibly occasion the entire destruction of the neck of the sac, even without inducing a strictly pathological or dangerous action; for it is well known that in old and large herniæ the neck of the sac occasionally becomes firmly adherent to the surrounding tendons and fasciæ; and then it sometimes happens that the quantity of bowel and omentum continually forced into the sac is too great to be accommodated by the expansive power or the interstitial growth of the serous membrane, and consequently the fundus and body of the sac are absorbed under the internal pressure. Now there is no mechanical or physiological reason why the same absorption should not occur under long continued external pressure at the neck.

It is extremely probable, then, that in most cases of the radical cure of hernia by means of trusses, the neck of the hernial sac is obliterated either by adhesion or more rarely by absorption. That this is not always the case is proved by the following observation:

In the early part of the year 1832, I was consulted in the case of M— C—, a girl of eleven years of age, residing in Bucks county. She had umbilical hernia about the size of a walnut, which was first observed when she was about four weeks old. The hernial orifice would receive the tip of the little finger; a portion sometimes of omentum and sometimes of bowel distended the sac in the daytime and disappeared at night; the linea alba was firm around the orifice, and the defect in the umbilicus was attributed to imperfect coarctation after the



separation of the cord. Reduction of the contents was always easy, the sac not thickened, and irreducible. The child had been always in delicate health, being dispeptic, and disposed to glandular and cutaneous diseases. She used but little exercise, and most of her unpleasant feelings were thought to be the result of gastric and intestinal irritation. I employed a metallic block formed very nearly upon the model now used by yourself in umbilical hernia, secured (very unphilosophically I grant,) by a bandage in place of a truss, the price of which the parents, being poor, were unwilling to pay. The retention was perfect and had been continued with great care for some months, when the child becoming impatient refused to submit to further annoyance. The orifice was then barely perceptible to the touch, but the sac distended with some serum still remained. I saw the patient in the fall of 1834; there had been no protrusion after the block was removed. The sac remained obvious, but was diminished to the size of a filbert; her general health was perfectly restored; psorophthalmia and some slight sense of weakness about the umbilicus on using great exertion being her only causes of complaint. The sac contained some serum which disappeared on pressure, but returned almost immediately when pressure was removed, proving that a communication between the sac and the abdomen still existed. I saw her grandmother last winter. She stated that the child had grown up, that she had led a laborious life, that there was no change either in the condition of the sac or in her general health; there had been no protrusion. I was anxious to cause the entire obliteration of the sac by means of one of your trusses, in order to guard her more completely if the part should be weakened hereafter by the effects of utero-gestation; but her constant occupation as a child's nurse, and the absence of any unpleasant symptoms, induced the grandmother to object.

Here, then, is a case which may fairly be regarded as radically cured, if the permanent prevention of any protrusion be a radical cure; yet the neck of the sac is not obliterated.

But let it be granted, for the sake of argument, that the neck of the sac is invariably closed, with or without *simple adhesion* in the surrounding cellular issue; let us examine how far this circumstance would be likely to oppose a barrier to the protrusion of the bowels.

The simple obliteration of the neck of the sac, would only place the case *in statu quo ante bellum*. In every instance before the hernia existed, there was a smooth continuous surface of peritoneum covering the spot where the future protrusion afterwards took place. The

simple obliteration effected, there remains a similar smooth and continuous surface of peritoneum! The same cellular tissue which filled the passage before the attack, fills it in precisely the same manner after the *cure*! It was not a deficiency of the peritoneum which caused the disease; how then can the removal of such a deficiency prevent its recurrence? The hernia, even if it appeared suddenly in the first instance, grew gradually ever after; and after the obliteration of the neck, there remains nothing to prevent either the sudden or gradual re-appearance of the hernia under the action of the same causes which originally produced it. The only effect of the obliteration, separately considered, is the temporary retention of the bowel, giving rise to a false security on the part of the patient or his surgeon; in consequence of which the former may be induced to neglect the precautions necessary to secure a permanent effect, and the latter may commit himself by the expression of opinions, that the current of a few weeks may prove to be fallacious.

But the obliteration of the neck of the sac may be combined with a condensation of the cellular tissue which, in the normal state, occupies the orifice. The effect of this combination depends mainly upon the extent of the adhesion. If this does not extend itself to the surrounding tendinous or fascial fibres—as soon as all mechanical restraint is removed, the surrounding free cellular tissue is dragged into the passage to supply the vacuity occasioned by the condensation; and being every where readily extensible, this dragging is accomplished by a very slight degree of force. Still, as there is more matter present in the passage after this effect is produced, than there was before the commencement of the treatment, there is also a somewhat greater obstacle to the return of the hernia; but this advantage is not only imperfect, but often temporary, as I shall attempt to prove in the sequel. Let us advance, then, to the consideration of the strongest possible case in which the supposed radical cure depends upon *simple adhesion*. If the surrounding tendinous fibres, the neck of the sac, the free cellular tissue of the passage, and the neighbouring fasciæ, were all consolidated in one general mass by adhesion, there would indeed be a strong barrier against the re-appearance of the hernia; though even this would not necessarily render the cure radical. The occurrence of such an adhesion is extremely improbable;—its general occurrence, almost impossible. There is no evidence, either presumptive or direct, within our knowledge, which goes to establish the existence of such an alteration of structure. The only direct evidence which could be adduced, would be obtained by a post mortem exami-

nation; and there is no post mortem examination on record, giving an account of the condition of the parts after radical cure by means of trusses. It is true that the number of the Ohio Medical Repository for January, 1836, contains a reference to an autopsy, said to have been made at the Pennsylvania Hospital, in the winter of 1834-35, upon a patient "who died of a chronic disease, while under the treatment of Dr. Hood;" and which displayed the general state of adhesion under discussion. By what means the mistake has occurred I know not; but I have the authority of Dr. KIRKBRIDE to state, that no such case or examination took place, with his knowledge, he being then a resident in the institution, and in charge of the surgical department. Had it occurred, it would doubtless have made its appearance in his clinical reports; nor could it well have escaped the notice of the members of the Committee, who are all familiar with the surgery of the house, and have long desired the opportunity of verifying their ideas in this decisive manner. There are several other Hospitals in Philadelphia; but such a circumstance happening at either of them, could scarcely remain concealed for forty-eight hours from one or other of the gentlemen engaged in this interesting investigation.

In case X. in the Report, Dr. ASHMEAD, speaking of a femoral hernia, remarks—"The skin over this spot, (*i. e. the hernial orifice,*) bears marks of pressure. It is discoloured, hard, and drawn backwards and slightly upwards, as if the soft parts beneath had been absorbed, or as if they were adhering closely to the parts beneath." This appearance has since been seen in several cases: but the sequel has proved that it is not the result of adhesion; for, after the truss is finally removed, it is found that these flattened and apparently condensed parts, resume slowly their original level and aspect, proving that the change is produced by a temporary interstitial absorption in the subcutaneous and adipose cellular tissue.

Granting, however, that such general adhesion is the ordinary result of the pressure of any truss, it still remains to be proved that this alteration would produce a radical cure: and there are strong arguments in favour of a contrary position.

The bond of union in simple adhesion—identical with that which occurs in what is termed by HUNTER union by the first intention—is known to be extensible; and it never loses this character except when loaded with other interstitial deposits, which, according to the ordinary language of the general anatomists, change the character of the tissue fundamentally. Wishing to avoid in discussing the present subject, all mooted points in physiology, I shall wave the question of the identity of

false membrane not resulting from loss of substance, and an ordinary cellular tissue, which though perhaps demonstrable, would be questioned by some eminent authorities. I shall rest contented with mentioning what few will deny, that simple adhesions and false membranes are not more resisting, *cæteris paribus*, than free cellular tissue. If evidence be necessary in support of this position, I will merely refer to the history of the re-union of bone in its earlier stages, before the chondroid or earthy deposits are thrown down, and the operation of DUPUYTREN for the cure of a distortion of the foot consequent upon permanent contraction of the gastrocnemii, in which he divided the tendo achilles, re-united it, and mechanically extended the bond of union. Even when there has been great loss of substance, if the union be effected by a bond of the same nature, the same extensibility is observable: as in operations for hair-lip and staphylororphy, and still more remarkably in those which are designed to replace excised cicatrices by flaps of uninjured skin from other parts. In none of all these cases do we see that tendency to almost indefinite contraction which follows the loss of substance in suppurating wounds. In the abdomen and thorax, the false membranes are seen, when simple, to undergo great extension when acted on by constant forces, though they resist all sudden changes with a power that sometimes occasions dangerous or even fatal disorder. Those adhesions in the chest which produce distortion of the ribs on the condensation of the lungs in diseases affecting their substance, are differently circumstanced, and cannot be regarded as simple adhesions, they are therefore only apparent exceptions to the law just laid down.

If these views be correct, and I believe they may be regarded as established in the profession, it follows that the adhesion between the obliterated hernial sac and the surrounding parts, in the hypothetical case under consideration, is not formed of materials calculated to resist with certainty the constant propulsion of the bowels acted on by the tonic and accidental contractions of the abdominal muscles.

The material in question is either cellular tissue, or something analogous thereto in its mechanical properties—*condensed it is true*—but condensed cellular tissue is not always a sufficient barrier to the progress of a hernia. A small unoccupied orifice in a tendon, firm in other respects, would not be so likely to permit a bowel to protrude, as would a large one, though filled with dense free cellular tissue. There is a very interesting paper by MR. TODD, in the first volume of the Dublin Hospital Reports, which contains a series of observations on that variety of hernia which is located within the cellular sheath



of the spermatic cord where the sac is formed under the constant opposition of cellular membrane by no means deficient in consistency. MR. TODD proves that this form of the disease is not confined to children. Indeed, it seems that nothing less resisting than a fascia will fully secure a part against hernia, nor are the fasciæ themselves a sufficient protection against the direct propulsive force of the bowels in all cases; for you have yourself proved to me that direct inguinal hernia, in which the sac bursts through the fascia near to, or immediately beneath the external abdominal ring, is an occurrence vastly more frequent than I had previously supposed.

Before I proceed to draw conclusions from what has been stated in this branch of the argument, it is proper to take notice of the seemingly positive results in favour of radical cure by adhesion, furnished by the experiments of M. BELMAS, submitted to the French Institute in 1829 or 1830. M. B. ingeniously combined the principle of the ordinary treatment for hydrocele, with that of DR. PHYSICK, in the employment of animal ligatures. (now relinquished,) and applied these principles to the treatment of hernia. His method of treatment was as follows: Making a small incision into the fundus of the sac, he introduced a stilet and canula; to the latter of which was attached a bag of gold-beater's skin, armed with a short tube and stop-cock. The canula was cautiously carried to the upper part of the sac, near the neck, and the stilet being advanced, the instrument was brought out through the integuments, leaving the empty bag of skin in the hernial sac, with its tube and stop-cock projecting through the upper wound. The bag was then injected with air until it filled the sac, and was suffered to remain until both bag and contents were absorbed. This was speedily accomplished, leaving the neck plugged by adhesion, and the cavity of the sac obliterated. No suppuration appears to have supervened.

This experiment was considered successful in the only human patient subjected to it, and also, in a fair proportion, out of a considerable number of dogs, (13 out of 30.) In the human subject there was no return of the hernia during the time of observation, which was, I think, between two and three months. Other pressing engagements will not allow me to ascertain, at present, whether this operation has been followed up in Paris since the date of the Memoir of M. BELMAS; and hence its merit is to be judged of by a single case, for the dogs can scarcely be admitted in evidence with propriety, as they are possessed of decidedly superior powers of vital resistance.

There is little doubt that such a measure as is here described,



would invariably secure the desired adhesions at the external ring in inguinal hernia, and at a point still nearer to the true hernial orifice in femoral hernia; but it is little short of folly to pretend that such adhesions could effect a radical cure: for, not only may fatal strangulation occur in inguinal herniæ which never reach the external ring, but the tumor may become enormously large in precisely such cases; in proof of which fact, if proof be necessary, I need only refer you to the paper of M. G. GOYRAND D' STIX, in the last fasciculus of *Memoires de l'Academie Royale de Chirurgie*. The attempt to cure hernia *permanently*, simply by obliterating the hernial sac, appears to me wild and unreasonable. In umbilical or large ventro-inguinal hernia, the distended bag in this operation, would lie directly in contact with the intestines within the abdomen; and the extent of its protrusion within the cavity could not be accurately calculated. It might be doubted whether much danger would result from this circumstance; but it is very unlikely that material security would result from an adhesion between several folds of intestine, and the adjoining peritoneum lining the cavity when the hernial orifice is large and direct.

After reviewing this part of the argument, you will judge how far I am warranted in drawing from it the following special conclusions:

1. The obliteration of the neck of a hernial sac by simple adhesion is but a partial protection against the immediate re-appearance of the disease, and affords no security against its ultimate re-production.

2. A permanent cure of hernia may take place without the entire occlusion of the neck of the sac.

3. General and simple adhesion involving all the parts about the hernial orifice, *might* offer such a barrier to the egress of the bowel as to prevent the return of hernia during life; but such a result is improbable, and it remains to be proved that such adhesion ever follows the action of a truss.

Having finished the question of the curative power of *simple adhesion*, I must now consider how far the other supposed result of the irritation, namely, the interstitial deposit, or callosity of the cellular tissue may oppose the return of a hernia after the removal of a truss.

When cellular tissue is strengthened by the interstitial deposition of fibrous or any other solid substance, it loses much of its extensibility, and of course may form a very efficient barrier to the egress of the bowel in hernia. When such deposits are made in situations where they are essential to the existence of a healthy organ, such as a bone, a cartilage, or a fascia, this loss of extensibility remains permanent, unless under the action of disorganizing diseases; but when

they are thrown out in places in which they are foreign to the original structure of the part, it is a general law of the economy, that they display a constant tendency to disappear in time by absorption or by softening. Instances of this tendency under physiological action, are witnessed in the removal of the surplus osseous matter around a fracture, and the solid deposits in the subcutaneous cellular tissue of parts subjected to unwonted pressure, when that pressure is removed, as in club-foot after the deformity is cured. Pathologically, the same law is exemplified in the history of scirrhus, tubercles, &c. I grant that there are apparent exceptions, as in the case of a wen or other tumour or excrescence of indefinite growth; but these, when strictly examined, will be generally found to result from mere hyper-nutrition; nor is it unusual to see them disappear entirely under remarkable changes in the balance of the constitution, or from even more trivial causes. A class of seeming exceptions more directly connected with our argument, is found in the permanent callosities about fistulæ and other false passages; and in this group the Committee have included the thickening about old hernial sacs. But these callosities depend evidently upon the permanence of the disease by which they are occasioned—remove the disease, and the callosities immediately come under the operation of the law. They may be properly regarded as abortive efforts of nature, to cure the affection on which they depend. Is it then reasonable to calculate upon producing them by artificial measures? Induce a hernia, and you will provoke a slowly increasing callosity:—remove the hernia, and the callosity will slowly disappear. You may cause thickening in certain parts of the body by pressure—remove the pressure, and the parts become gradually attenuated again.

The only real exception to the law that I am acquainted with, is seen in parts which have undergone a solution of continuity with displacement of the separated portions. In cases of this character, the cellular tissue occupying the interval between the portions, (if the interval be not too great, and the tissue be sufficiently free to perform its functions with rapidity and ease,) often takes on a vicarious action, and secretes within itself the interstitial matters peculiar to the ruptured organ; thus uniting the displaced extremities, by a newly created and permanent piece of the same nature with the organ itself. This process, so different in its results from simple adhesion, is often performed in an awkward and imperfect manner, so that the new formation is sometimes more bulky and stronger; and at others smaller

and weaker than the original organ. This operation of nature is most obviously exemplified in the re-union of fractions with displacement, where, as has been already remarked, the surplus osseous deposit, at first thrown out on all sides, round and within the seat of the injury, is speedily re-absorbed; but that portion which connects the extremities of the fragments, and is necessary for the preservation of the functions of the bone, is never removed. But the same process is noticed in the union of most other organs; and, although the nature of the bonds which unite the broken fibres of nerves, muscles, and tendons, have never been thoroughly examined, there is every reason to believe that the nature of the operation is universally the same.

I have certainly seen the radical cure of hernia effected in this manner, in the case of a sailor who received a kick from a horse on the Course at Calcutta, in 1824. The bowel passed directly through the tendons at the linea semilunaris, some inches above Poupart's ligament, a few fibres having been divided by the edge of the hoof, without a wound of the integuments. He did not perceive any tumour at the part until three weeks after the accident, when on the homeward passage. As I had no means of effectually retaining the bowel while at sea, I applied a methodical bandage; but the tumour gradually enlarged, and some months elapsed before a complete retentive apparatus was contrived and applied. I examined him carefully six or eight weeks after I first secured the retention; a distinct thickening and hardness, resembling a button of tendinous matter, marked the site of the hernial orifice. The man was at that time radically cured. A wide uniting bandage and compress were the means employed in the treatment. No suitable truss could have been obtained without considerable expense, as all the ordinary forms were totally inapplicable in such a case.

It is exceedingly probable that every case of hernia occurring after adult age, is attended with rupture of some tendinous or fascial fibres; and in recent cases the re-union of their separated extremities by an irregular fibrous deposit, must contribute very much to a radical cure of the disease. In those inguinal herniæ in which the bowel bursts directly through the fascia transversalis, this cause alone is probably sufficient to effect the cure, when all protrusion is prevented, unless the orifice be large, or the case one of long standing. In common inguinal, femoral, and umbilical herniæ, this re-union probably plays a secondary part; and in all herniæ originating in early life, the cure must obviously depend almost exclusively on other causes.

It would be very interesting to inquire how long a hernia may exist,

before the continued presence of the serous sac renders the union of the broken fibres hopeless. There is something in the thickening of the edges of the orifice in the case of Major W. \* \*, and several other instances of ventro-inguinal hernia, with enormous orifices, which have contracted to a great extent under your treatment, that seems very much like the effect of this process.

But while dwelling upon the importance of the union of fibres by an intermediate deposit, we must not neglect the fact, that the irritation produced by the truss has no tendency to *cause* this union: whether it *promotes it* is a separate question.

If consolidation, with thickening of the parts were to "follow the irritation of the truss, it would furnish a temporary barrier to the propulsion, and the barrier would probably prove much more durable than that resulting from simple adhesion; but that it could not be considered permanent, has I think been pretty fairly proved.

There is no evidence adduced by the Committee to show that such a thickening ever does result from the pressure of the truss; nor have I seen any, since the Report was published. The same pressure which will produce thickening in one part of the body, will produce absorption in another. This fact is universally acknowledged. Now, ample evidence has been collected since the commencement of the investigation of this subject, to show that the pressure of the truss does habitually produce interstitial absorption in all parts exterior to the abdominal tendons; and there is neither proof nor reason for supposing that it acts differently on the cellular membrane in the hernial orifice, or on the tendons and fasciæ. In the face, then, of some testimony, I fear too hastily given, I feel compelled to this conclusion: *The irritation of the truss does not effect the radical cure of hernia, by producing a consolidation and thickening of the parts.*

It still remains for us to examine whether the pressure of the truss can be advantageously carried so far as to produce a pathological condition of the parts, or in other words, whether inflammation from mechanical causes may produce the radical cure of hernia.

Inflammation in cellular parts beneath the integuments, when it neither subsides by simple resolution, nor goes on to mortification, always terminates ultimately in one or other of the following results—*adhesion* or simple condensation; *interstitial deposition*, which, if the matter thrown down be solid, gives rise to a temporary structural alteration of the part, or *suppuration* which is attended by the formation of a new membrane, that soon acquires a much more firmly fibrous character than the bond of union in simple adhesion, and dis-



plays a tendency to indefinite contraction which, to the distress of surgeons in many classes of injury, cannot be restrained even by powerful forces—witness the history of extensive burns.

The influence of the two first of these results in opposing the protrusion of the bowel in hernia, has been fully discussed in the previous portion of this letter; for adhesion and interstitial deposition are the same in their nature, and are liable to the action of the same laws, whether they appear after a state of mere physiological irritation or one of decided inflammation. The latter is therefore transient in its nature, and if it ever remain permanent in an unnatural situation, as it sometimes does in organic stricture, a close examination of the circumstances will show the persistence to arise from the continuance of the excitement which originally caused it—remove that in any way, and it gradually disappears.

It is only necessary, then, to consider whether actual suppuration in or about a hernial orifice will produce a radical cure of hernia, and that it does so, is completely proved in a variety of ways. The history of cure after mortification of strangulated omentum, sloughing of the sac, &c. places the matter beyond a doubt. The ancient operations for the obliteration of the neck of the sac at the external abdominal ring, though they could not secure the patient against concealed hernia, prove that suppuration establishes an effectual barrier to the progress of the disease, as would indeed be inferred *a priori*, by any philosophical surgeon. But in order that the cure effected by such means should be perfect, it would be necessary that the suppuration should extend to the very origin of the neck of the sac, and I by no means despair of seeing this process usefully applied in the operation upon strangulated hernia, which, as at present performed, too often renders the retention of the bowel still more difficult by producing the enlargement instead of the contraction of the tendinous orifice. To attempt the production of suppuration in such a situation by means of a truss, would be perfect madness. The only case of the accidental production of an abscess by such an instrument that I recollect to have seen recorded, is quoted in terms of strong reprehension, I think, by RICHTER: it resulted in a radical cure, but cannot be imitated without gross mal-practice. A celebrated negro empyric, in this city, once obtained great eclat by puncturing an enormous popliteal aneurism, with his lancet—an accidental clot is supposed to have been washed into the mouth of the artery so as to close it—the *patient recovered!* There is a strong parallelism between these cases.



Need any thing further be said in favour of my next conclusion? It is this :

*The radical cure of hernia by trusses does not depend upon an inflammatory process.*

I have advanced thus far in the endeavor to prove that the irritation produced by the truss is not the sole or principal cause of the occlusion of the hernial orifice, and that inflammation from the same source is altogether unnecessary if not absolutely injurious. Falling back, then, upon the position taken by the committee, that the good effects of the truss are principally if not entirely due to its retentive power, we are now prepared to examine into the principal causes of occlusion, when the obstruction resulting from the frequent presence of the intestine, and the distending force which it exerts on the hernial orifice, are removed by the mechanical action of a perfect apparatus.

It is unnecessary for me to repeat the theoretical remarks of the Committee on the contractile force of false passages when left for a long time unoccupied by foreign substances, but it may be well to notice a few facts having an indirect connexion with the application of those remarks to the subject under discussion. In the case of the little girl already narrated in this letter, you will perceive that since the orifice in the tendons was so far reduced in size as to retain the intestines perfectly, the hernial sac, though it still preserves its connexion with the general cavity of the peritoneum, has been rapidly diminished in size, and doubtless, if no accident prevent, will ultimately disappear or retreat within the abdomen. You have seen the same changes in progress in cases that have been radically cured by yourself, where the hernial sac is considerably thickened, but displays a disposition to become obliterated *per se* after the close of the treatment, just as anormal serous bursæ are often observed to do when the cause which produced them is removed.

I cannot believe that the formation and spontaneous removal of hernial sacs and orifices are the result of any special or peculiar physiological action. They are explained by the operation of three laws of the economy which are apparently universal in their effects.

1. When any part is unduly distended *within certain limits* by a mechanical force, it yields a little in virtue of its elasticity, becoming at the same time embarrassed in its functions. If the force operates for a considerable time, the part becomes accustomed to its new position and recovers its functions, as in muscles elongated by a dislocation. When the distention is removed, these changes are reversed in

the same order—as in a muscle thus elongated, after the luxation is reduced.

2. When the distention is gradual and long continued, it produces effects very analogous to those of exercise on muscular fibres. The part becomes the seat of a hyper-nutrition and is actually enlarged by interstitial growth—as in the uterus during gestation, and the skin over large tumours. Conversely; when the distention is removed, there immediately commences an interstitial absorption, and the part is slowly reduced to its original bulk—as in the uterus after labour, and the skin on the spontaneous discussion of large tumours.

3. Any part that is permanently deprived of the power of exercising its functions is removed by nature as useless; or rather, it is slowly reduced to the state of simple cellular tissue, the nidus of all the organs and tissues—as in the muscles and tendons of an ankylosed limb, the thymus gland of infants, &c.

Apply these three laws to the history of the radical cure of hernia, and I think we shall arrive at the principle link in the chain of causes which bring about that desired result when trusses are employed.

In hernia, both the sac and the edges of the tendinous or fascial orifices are liable both to the sudden and the gradual operation of distending forces, and the disease cannot exist for any great length of time, without displaying all the effects of distention as laid down in the first two laws. The sac and the tendinous fibres round the orifice, are alike enlarged or elongated by hyper-nutrition; they are habitually stretched and are accustomed by habit to their new position, and they are occasionally liable to additional distention in virtue of their elasticity. Let perfect retention be secured, and we have; First, an elastic contraction both of the sac and the tendinous orifice, which happens very speedily, and the parts soon becoming accustomed to that contracted position: a few days may suffice to render the recurrence of a propulsion obviously more difficult if the orifice be small: Secondly, we have an interstitial absorption of the hypertrophied parts, the sac continually lessening in capacity, and the tendinous fibres becoming shorter and shorter, and more and more capable of resisting the exit of the intestine under the action of the abdominal muscles. This change, slow even in the sac, is very slow in the tendinous parts. In the latter, it terminates when the fibres which have been distended, but not ruptured, have returned to their original length, and a degree of strength proportioned to the age of the individual: the security resulting from it, supposing no fibres to be broken, is therefore equal to that which would have been enjoyed by

the patient had he reached the age at which the treatment is completed without the occurrence of a hernia. In the sac, on the contrary, the interstitial absorption may go on indefinitely, under the operation of the third law, unless checked by adhesion or by excessive serous effusion.

Here, then, we have the first great cause which promotes the radical cure of well retained hernia; but it is not the only cause; if it were, the cure would often prove incomplete.

It has however this advantage, that its operation is not restricted by the duration of the hernia; at least not until the patient reaches an age at which all the functions, and especially those of very solid parts, become languid and embarrassed.

The contraction should be, of course, most remarkable and efficacious in those cases of hernia which originate in early life, at whatever period they may be placed under treatment; for in these, the orifice is more generally the result of simple distention, with little or no rupture of fibres. The length of time required for the completion of the contraction of tendinous parts by interstitial absorption, can only be fixed by long and close observation. It must vary with the age of the patient and the size of the orifice; but it would be very unreasonable to anticipate it in less time than several months. The history of radical cures in hernia, said to have been completed in from six to twenty days, is so utterly at war with the well-known laws of injuries in tendinous parts, that it may safely be classed with the accounts of alleged cures of broken legs in adults in three weeks, and those of necrosis in as short a time, which have been reported by practitioners of various degrees of respectability: they disprove themselves by proving too much.

The other most important cause of radical cure unquestionably is, the re-union of the tendinous or fascial fibres which may have been ruptured either at the commencement of the disease or at the moment of some unusual propulsion of the bowel during its progress. In the adult, when the accident first occurs, it is most probable that some fibres are torn, in every instance, and in all forms of hernia; but in direct inguinal and ventro-inguinal hernia, the orifice is at first formed entirely by the rupture of a fascia; and when perfect retention is secured soon after the accident, these cases ought to recover more promptly and completely than any others, for their nature is that of a simple internal wound; but when such ruptures have continued for a long time, and are complicated with enlargement of the orifice by distention, these very cases must be considered the most hopeless

of all. How long the constant or occasional presence of the intestine in the neck of the sac may continue, before the separated ends of the tendinous or fascial fibres become adherent to other neighbouring fibres, or so lost in the surrounding cellular tissue, as to lose all tendency to re-unite by fibrous matter; or whether these results ever take place, cannot be determined without numerous post mortem examinations. From analogy we should be induced to confine the operation of this cause of cure to recent cases only.

Be this as it may, one thing is well known—the bond of union in tendinous parts, when not complicated by suppuration, remains for a very long time in an extensible condition; and hence it is all-important that the resistance of such parts should not be hastily tested. Months must pass before the new bond can be depended upon with safety. But as the new deposit in this kind of union, like what is called the callus in fractures, is generally more bulky, and may become even more solid than the original structure, it follows that this mode of cure *may* render the patient even more secure than he was before the occurrence of the accident.

The third and last cause to be noticed is that hinted at by the Committee in the 8th section of the Report—the inexplicable tendency of false passages to contract indefinitely. The occlusion of fistulæ is attributed by some, to the contraction of the suppurating membrane which lines them; and they deny that a hernial orifice is placed in similar circumstances; but the changes which have taken place in some of the oldest and worst cases of ventro-inguinal hernia under your treatment, are sufficient to demonstrate the views taken by the Committee. Take the case of Capt. B. —, for instance, whose hernial orifice at first received the integuments with three fingers, but will not now receive more than one finger. The case is of many years standing. The bowel suddenly burst through the fascia to reach the external ring; all attempts at union between the ruptured extremities of the fibres was prevented by the continual protrusion which no truss could restrain until you took charge of the case. It is altogether unreasonable to attribute the contraction of the orifice, under such circumstances, to the operation of either of the causes previously laid down. Let those who consider the contraction of fistulæ as the result of a power peculiar to suppurating surfaces, explain this change in old herniæ. To me it appears similar in all respects to the closing of the foramen ovale of the heart, and the peculiar vascular ducts of the fœtus after birth. It is obvious that the substance which thus



gradually closes the orifice is firm and resisting, like tendon or fascia, and not like simple cellular tissue. Adhesion of the skin to the parts beneath there is not; nor are there any appearances of condensation or thickening in the subcutaneous tissue. By what peculiar process such contractions are accomplished is not, and probably never will be known; but the fact of their occurrence is rendered less startling by the multitude of analogous changes that are noticed in other parts.

Dismissing with these remarks, the subject of the principal causes of the occlusion of the hernial orifice, in the process of radical cure by trusses, I will add but a few words on the question how far the irritation of solid truss-blocks may promote or accelerate the cure.

If there be any truth in the positions maintained in the preceding portions of this letter, the only way in which irritation can aid in effecting a radical cure, is by producing an increased determination of blood towards the part; which hyperemic condition, when not carried to an improper extent, always increases the functional powers. Now, as the causes of the permanent contraction of the hernial orifice which have been already mentioned, all consist of sanative changes in the function of nutrition; it is probable that they might be materially accelerated in their action by a gentle irritation communicated to the edges of the orifice; whether the irritation of the blocks is thus communicated from the skin to the ring either in common inguinal or femoral hernia, I very much doubt, but in ventro-inguinal and umbilical hernia it probably is. There can be no question, however, that *inflammation*, which is a morbid action, if thus communicated, would prove decidedly dangerous, and would tend to embarrass instead of elevating the functions of the parts; some would probably quote the good effects of the seaton in pseud-arthritis in opposition to this doctrine; but the employment of the seaton in fractures is the result of an unfortunate necessity. When simple irritation can be artificially produced in the same situation it is even more efficacious, and the decidedly inflammatory condition of the parts immediately round the seaton, for a time retards instead of promoting the firmer union which always begins at a distance and does not become complete until the seaton is removed and the inflammation subsides.

In support of the superior claims of irritation among the means for radical cure, the evidence of Mr. LIZARS, of Edinburgh, (see Ed. Med. and Surg. Jr. No. LXXII,) may be quoted against me. He asserts that he has met with great success for many years, in curing hernia by washing the part frequently with oak bark; but a cer-



tain instrument maker, in Paris, quoted by 'TAVERNIER, was beforehand with him in the use of astringents, and not behind him in alleged results. That there was nothing peculiar in the irritation produced by astringents is shown by the fact that the latter person used them indiscriminately with ammonia and other stimulants. Both these gentlemen employed trusses in conjunction with their other local applications, and as their views of the *modus operandi* of the former required unusual care to be exercised in the retention, it is not altogether unreasonable to attribute much of their success to the *instruments*.\*

If, however, the irritation be so important as it is deemed by some, there is no necessity, with your apparatus, to resort to any other application than the truss, the blocks of which may be made to produce the effect to any extent required.

You have done me the honour to ask my individual opinion on the *modus operandi* of your trusses, after the examination of numerous cases. It is frankly this—

'They owe almost all their very remarkable success to their perfect retentive power, which is probably aided by a little moderate irritation from pressure in umbilical, direct, and ventro-inguinal hernia, possibly in common inguinal hernia, but not in femoral hernia. It is scarcely practicable to apply the instruments without producing as much irritation as I should think advisable, and I have been increasingly pleased with their effects, as your blocks have been gradually improved from time to time in such a manner as to remove the danger of inflammation, and to reduce the irritation to a moderate redness. They are now convenient, pleasant, and safe in their action, and certainly not less successful than when you were more strongly influenced by the doctrine of adhesive inflammation.

You are at liberty to employ, as you see fit, the contents of this letter, which has swelled itself vastly beyond expectation with the high interest of the subject, though it is still much less perfect than it might have been, had not other engagements interfered with its revision. Whatever it contains must be regarded as the result of individual reflections, somewhat crude withal, and in no degree binding upon me or my

\* I have examined the references of Dr. C. and find that the instrument maker confined his patients to their beds. Whether Mr. LIZARS was in the same habit is not stated. I have before alluded to the fact that long continued confinement, in a recumbent posture, has been known to cure a hernia without the aid of any other measure; but in practice, this remedy would be worse than the disease.

colleagues, officially, as members of the Committee. In the hope that your labours in this interesting department of surgery may promote extensively the interests of humanity,

I remain your obedient servant,

REYNELL COATES.

HEBER CHASE, M. D.

*Philadelphia, July 15, 1836.*

## CHAPTER VIII.

ON THE MANNER OF APPLYING THE DIFFERENT INSTRUMENTS, AND SOME PRECAUTIONS NECESSARY TO BE OBSERVED IN USING THEM.

THE surgeon should have by him, at all times, a sufficient number of instruments from which he can select a truss suitable for any case that may present itself. I have found six sizes sufficient to meet the demands of all ages and dimensions of figure, from the child of six months to the adult; and in these sizes the length of the spring as measured from the middle of the strap-button, varies regularly from nine inches to twenty-seven inches.

When called to a case, the first duty of the surgeon is to determine the kind of rupture, and the extent to which it has progressed; and this requires no inconsiderable amount of attention and experience. For, in female patients who are remarkably fat, it is not always possible to distinguish between an inguinal and a femoral hernia. In order to ascertain the nature of the rupture, it is best to place the patient in an erect position; but if we wish to know the extent of the orifice, the recumbent posture is preferable.

The diagnosis of the common inguinal and ventro-inguinal rupture, depends upon the condition of the external ring; and this is best determined in the male subject, by placing the index or the little finger upon the surface of the scrotum, about an inch below the

brim of the pelvis, and reverting it from that point, so as to bring the point of the finger into contact with the columns of the external oblique muscle. If the hernia be of the common inguinal variety, the finger, after reaching the external ring, meets with very considerable, and generally insurmountable opposition to its advance, and takes a direction corresponding with that of the inguinal canal: but in ventro-inguinal hernia, the resistance is much less forcible, and the finger seems to plunge directly into the abdomen.

In all the varieties of inguinal, ventro-inguinal, and femoral herniæ, the trusses surround the pelvis nearly in the same manner, except that, in the last mentioned species, the anterior end of the spring is curved downwards in a somewhat more rapid spiral, than in the other varieties. The dorsal pad rests with its centre over the spinous process of the last, or next to the last lumbar vertebra. The spring encircles the pelvis, passing from a point just beneath the anterior superior spinous process of the ilium on the diseased side, to the same point on the sound side, and the strap appended to the spring-cover completes the circuit, being secured to the button on the commencement of the spring. (See fig. 29, p. 89.)

In the application, after the block and spring are properly adjusted, the perineal or thigh-strap should be drawn around the perinæum, and secured to the button on the end of the spring; and the strap of the spring-cover is then brought forwards and fastened to the same button, and its extremities are passed through the loops attached to the commencement of the spring-cover.

In some instances of obstinate ventro-ingual, and also in femoral hernia, the bowel is more readily retained by attaching the thigh-strap to a button on the lower end of the block-slide.

It is best to apply the instrument while the patient is in a recumbent posture; but when the adjustment is completed, he should be directed to rise, with great caution, for the action of the diaphragm and the abdominal muscles may occasion a protrusion of the bowel, if the attempt be carelessly made.

The patient being in an erect posture, a careful examination of the several parts of the instrument should be made; for the relative positions of the various parts of the truss are not always the same in the recumbent, and in the erect posture, until the instrument becomes habituated to its proper bearing, which takes place in a few days.

In the common inguinal truss, the block not only presses directly upon the whole extent of the track of the inguinal canal, but includes also, the internal ring and several lines of surface around it, which is a matter even more important.

The pressure of the block in this instrument, is made directly in the line of the inguinal canal, which corresponds with a line drawn from the anterior superior spinous process of the ilium to the symphysis pubis, the lower edge of the block running parallel to, and very near the margin of Poupart's ligament. These points must serve as our guides in the application of trusses in the inguinal region.

If the surgeon, on applying the instrument, should find it but ill-adapted to the individual case, he has two modes of adjustment at his command—first, the

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flexible neck of annealed iron, which permits him to change the direction of the block at pleasure ; and secondly, the block-slide and screws, which change the length of the instrument. If the case be one of ventro-inginal hernia, the common inguinal block should be removed, and the ventro-inginal block screwed on to the block-rider, no other change than this being required to accommodate the instrument to the last-named variety of hernia. The mode of applying the common inguinal truss is seen in fig. 29, p. 89.

In applying the ventro-inginal truss, it will be recollected that the same general rules must be observed, except in regard to the block, which constitutes the only difference between this and the instrument last mentioned. The mode of application is seen in fig. 30, p. 90; and the accurate manner in which the block can be adapted to the form of the pubic bone, is represented in fig. 23, p. 82.

This block is intended to give its pressure over the external ring, and the lower half or two-thirds of the inguinal canal, when it exists in this variety of hernia. The precise point of pressure may be varied in the manner prescribed for the inguinal truss, by means of the flexible neck, the block-slide and screws. I have never failed in retaining the bowel by means of this instrument, even in the worst, largest, and most obstinate cases, such as presented in the patients P. B , *Case 1*, and Major W., *Note 1*, of the Report of the Committee so often quoted.

In adjusting this truss, it is necessary to be particularly careful to prevent the block from pressing either on the angle or the body of the os pubis. Should

it rest upon the former, the annealed neck must be bent so as to throw the block a little outwards towards the thigh; if upon the latter, the pressure is intolerable to the patient, and if not relieved by the retreat of the block on the slide, and the bending of the neck, the instrument must be removed, and a smaller one substituted.

*Of the Femoral Truss.*—The form and peculiarities of this instrument are described under the head of complete trusses, and it only remains to give an account of the mode of adapting the block, which is an operation requiring great precision. The correct adjustment of the block to the femoral ring, is one of the most difficult tasks connected with the employment of trusses.

The block must be made to press between the femoral vein and the body of the pubis; if it press on the angle of the pubis the patient cannot endure the pain; and if it press strongly on the vein, the circulation in the leg is retarded, and a sensation of numbness with an œdematous swelling will soon follow. If the block be placed too low, the bowel will escape—if too high, Poupart's ligament may be lacerated. The object is to place the prominent angle of the block immediately below the ligament, so that when the absorption caused by its pressure is at its height, it may even be inserted somewhat under the edge of the ligament, close to the femoral ring. The perineal or thigh-strap of this instrument is attached to a button on the lower end of the block-slide for the purpose of giving greater security to the lower end of the block. The mode of applying this truss is seen in fig. 31, p. 93.

The application of the umbilical truss, differs but little from that recommended in the other preceding instruments. This truss surrounds the abdomen like a

hoop, the centre of the dorsal pad and that of the block being exactly on the same level. The manner of the application is seen in fig. 31, p. 93, and the adjustment of the block is always made while the patient is lying down. In order to prove the security of the apparatus, he should then be directed to rise, and make a full inspiration followed by a forcible attempt at expiration, which is a better test than the effort to cough. In cases of enormous orifices, especially such as sometimes occur in very corpulent women, requiring blocks from four to seven inches in diameter, this proof may be spared, for it is quite sufficient success upon a first trial in such cases, to secure the bowel from protrusion even when no effort is applied.

In ventral hernia, it is impossible to lay down rules for the application of instruments, for the orifice may be so variously situated that the cases bear scarce any resemblance to each other.

With regard to the accessory parts of trusses it may be remarked that *scapularies* are very seldom requisite, though I have occasionally resorted to them—as in the case of Major W.

*Thigh-straps*, also, are not always absolutely necessary, though it is safer for the patient to use them under all circumstances. They may be more safely dispensed with in inguinal than in femoral hernia—it is frequently more agreeable to discontinue them, but this should never be permitted except in patients who have pendulous abdomens in whom there is no danger that the block will slip above the orifice of the hernia.

*The dorsal pads* have been constructed of different forms. I prefer, however, the circular shape for all instruments employed in the inguinal region, and the oblong for umbilical and ventral trusses.

These pads afford great relief to the patient, and serve to take off in great degree, the pressure occasioned by the passage of the strap round the body. In the trusses of Salmon & Ody, Hull, &c. the pressure of the spring is sustained altogether by the back and front pads, and there is no strap round the body, but I find that this strap enables us to retain the hernia with a far less powerful spring than is requisite when no strap is used. In the instruments heretofore employed, the back pad is fixed permanently on the spring, after it is once adjusted to the case, but in my apparatus, it is always made moveable, being fixed to the spring by one sliding loop, if round, and by two, if of an oblong form.

This arrangement is adopted because it is found from experience that the constant pressure of the back pad over one spot often occasions an irritation of the skin, and sometimes an absorption that brings the pad almost into contact with the spinous processes of the vertebræ. This causes a great deal of suffering, particularly in females, and is easily remedied in most cases by shifting the pad along the spring occasionally, either to the right or left side of the spine. In one instance, that of Mrs. —, a lady of this city, the patient herself suggested the employment of two moveable back pads, one on each side, and I have since resorted to this treatment in several very obstinate cases with the happiest effect.

In most instances, the patient is able from the beginning, to wear his truss day and night without intermission, which practice should be strictly enjoined in all cases unless productive of great annoyance from the pressure at night: this effect is rare, and when it does occur, the truss should not be removed at night until



after the patient is in bed, and it should be re-applied before rising in the morning.

Attention to this injunction is absolutely necessary; and after the first application of the instrument, the patient should never allow it to be removed, while he is in a standing or sitting position, unless by the express direction of his surgeon.

Although some cases go on uniformly improving, until the radical cure is completed, without a single alteration of the truss after its first application, this cannot be expected in the majority of cases, and it is of much importance that the surgeon should see his patient daily or oftener for the first few days, until the instrument has taken its proper set, after which it does not require such frequent attention.

There is one very improper propensity displayed more or less by all patients and their friends, and sometimes indulged even by the medical attendant—this is, testing how far the cure has advanced, or whether it be not complete, by taking off the truss and using exertions or coughing, to see whether the bowel will not protrude! this practice cannot be too strongly censured. I have now under treatment a gentleman of great respectability, who is labouring under a relapse from one of these foolish efforts. They should never be made until the cure is supposed to be complete, and then, only by order of the surgeon, and in his presence, when he wishes to determine by gentle trials whether there remain *any disposition to propulsion*, or whether it be safe to throw off the instrument.

It is very wrong for the surgeon to lose sight of his patient entirely before the conclusion of the case, for though his daily attention may not be required for any



considerable length of time, it is very necessary that he should occasionally examine the condition of the parts and ascertain the progress of the cure. The general practice of applying a truss and then turning the patient loose to take his chance, is always inexcusable, and with the instruments recommended in this work it is peculiarly improper.

It is directed by some, that a certain number of folds of silk should be placed between the blocks and the skin at the commencement of the treatment, and removed according to prescribed rules. This, however, is not found necessary, for the great majority of patients wear the instruments with the blocks next the skin; but as a few of them prefer some folds of linen, silk, or woollen material beneath the block, it is proper to caution such against employing so many folds as to alter the shape or bearing of the block. In cases of umbilical herniæ with enormous sacs over which the skin is extended so as to fall into folds after reduction, and also in other herniæ occurring in extremely corpulent subjects, the insertion of a compress becomes indispensable to prevent excoriation from the corrugation of the skin.

The patient will find it necessary to bathe the parts about the rupture frequently during the use of the truss; this may be done with some slight astringent, or with plain cold water, which will be found as grateful, and probably quite as useful, as any other wash. In washing, the patient should lay on his back, and raising the front of the truss for a moment, he should use a sponge or wet towel for the purpose.

Should the patient be inclined to take the bath, either in fresh or salt water, he ought to be provided with a suitable instrument, and should by no means go into the water without his truss. The safety with

which this has been done by many, towards the conclusion of the treatment, is not a sufficient proof of its propriety, for swimming is a very powerful exercise, and the bath increases very much the action of the muscles. During last summer, a gentleman under my care, whose bowel had been perfectly retained for two weeks, visited Cape May, to enjoy the luxury of bathing;—he had entirely neglected his truss with which I had provided him for the express purpose of wearing it in the water—the consequence of his neglect was a relapse.

The Committee of the Medical Society, in their Report, have spoken in strong terms against the propriety of applying trusses on young children; but with all due diffidence in contending against such high authority, I must be permitted to defend the practice, in preference to any other mode of treatment, as soon as the skin of the infant is able to bear the pressure. I have once applied the truss on a child only six weeks old, and frequently on those of the age of six months. The perfect ease with which the instrument is worn in such cases, and the successful result of the cases, is such as to confirm me in the opinion that this method is easier and better than any form of bandage and compress, or other plan of treatment recommended by the profession, except perhaps in the umbilical hernia of very young children. The earliest age at which I have employed the umbilical bandage is six weeks.

In still younger infants, I have employed the wooden block, with a kind of belt instead of an instrument with a spring; but as this apparatus is not yet

completed to my entire satisfaction, I do not feel prepared to offer it to the public at present.

It is mentioned by DR. PARRISH, in his late work on *Hernia and Diseases of the Urinary Organs*, that DR. PHYSICK has always succeeded in curing umbilical hernia in young infants, by attention to the bowels and directing the nurse to support the part with her hand when the child cries. This is a beautiful proof of the strong natural disposition of the orifice to contract when the sac remains unoccupied; but I have seen the practice fully tried without apparent benefit; and it is next to impossible for the nurse, at all hours, both in the daytime and at night, to apply her hand to the umbilicus whenever the child cries. I cannot think the plan likely to cure in all cases; still, the direction given on such very high authority, should be carried into effect with all possible care; for even if it should not accomplish a cure, it must prevent the orifice from becoming rapidly enlarged, until the age at which instruments may be safely employed, and thus gives the patient a better chance of rapid recovery.

*Of the Abdominal Band.*—In very large old herniæ, when the patient has a remarkably pendulous abdomen, the folding of the parietes in the hypogastric region, sometimes renders the application of trusses difficult and their action uncertain. In such cases I have found great advantage to result from the application of an abdominal band.

This band is intended to act upon the pendulous parts in the manner of a suspensory bandage, preventing them from becoming excoriated by the pressure of the upper edge of the spring. It is made to

surround the lower half of the abdomen and the wings of the ilia, including the truss and employing the cristæ of these bones, for the principal suspension force. It is secured in front by buckles.

I employed this apparatus with the happiest effect, to aid the truss in the cases of Capt. P— B—, and Major W—; the first Case, and the subject of the first Note in the Report of the Committee. It should be applied while the patient is in a recumbent posture.

When a peculiarly irritable condition of the skin, or carelessness on the part of the patient gives rise to chaffing or excoriation, I have found the most prompt relief to result from dusting the part with the carbonate of zinc.

*Of the Measurement of Patients.*—Although I have before stated that the surgeon who gives his attention particularly to this disease, should have by him at all times, a large supply of instruments, from which he can select a proper one in each particular case, yet those whose situation or pursuits do not bring before them a great number of cases may occasionally wish to order a single instrument to fit a casual patient: I do not know any better method for ordering the truss, under such circumstances, than to send notes of the following particulars, if the hernia be in the inguinal or femoral region: 1st. The measure in inches, taken horizontally round the body, from immediately above the base of the sacrum to the linea alba, passing, on each side, just below the superior anterior spinous process of the os ilium. 2d. The kind of hernia, distinguishing between common inguinal, ventro-inguinal, and femoral rupture; (it is of no importance whether the

intestine descend into the scrotum or not); and, 3d. The side ruptured.

In umbilical hernia the measure should be given in inches, encircling the body at the umbilicus.

A second method is sometimes resorted to : Take the size of the body, according to the variety of the rupture, by adapting a wire to it ; transfer this measure to paper, and forward the paper.



## CHAPTER IX.

### CASES AND RESULTS OBTAINED BY THE USE OF THE IMPROVED INSTRUMENTS.

SINCE the Report of the Committee of the Medical Society was read, the amount of evidence as to the action of the apparatus, has greatly increased; but the cares of business, and the continual extension of connexions at a distance, have rendered it impossible to preserve notes of the progress of every individual case, as fully as would be desirable.

In drawing up the following cases and results, I have selected those only which have been most regularly noted; but no partiality for any particular mode of treatment, or reserve in the statement of unfavourable accidents, has been permitted to interfere with the publication of the simple truth.

The record books of cases are still open to the inspection of the Committee, who are neither disposed to sleep upon their post, nor to hazard hasty conclusions; and if the natural disposition to believe what we ardently desire should lead me to flatter my own apparatus, or its effects in any instance, it is not probable that the public will be suffered to remain in ignorance of the fact. I may therefore claim, without any breach of modesty, the credit of offering testimony entitled to full credence; the facts are given without reservation.

The professional reader will remember that, at the

time of the Report, the new modes of treating ventro-inguinal and femoral hernia were by no means complete, and, in fact, the strictures contained in that paper have contributed not a little to hasten the more recent improvements. The femoral and ventro-inguinal blocks,—the double and bathing trusses,—the compound femoral adjustment, &c., have all been contrived or perfected since that period, and many little details of great practical importance, but almost incapable of description, have been matured.

These alterations have very much facilitated the adjustment of the instruments, and have increased their retentive power; and the results of some of the worst cases noticed by the Committee, have been much more favourable than was anticipated at the time of the Report. With these remarks *premised*, I shall proceed to give a detail of the cases reported by the Committee, drawn up to the present date, from my own observation, adding a few other cases which have been entered at some length upon the books. The chapter will conclude with a tabular view of the varieties of hernia, the age and sex of the patients, the causes of the accidents, and other points of interest drawn from the observation of one hundred cases, to serve as a foundation for future statistical calculations.

CASE I. (*Case II. of the Committee.*)—"October 5th, 1835.—Master S—, a fine healthy lad, 13 years of age, has laboured under inguinal hernia of the right side for about seven years. The tumour has never been of very large size, and is thought to have been first caused by a fall.

"This lad had used MR. CHASE'S truss for about

two weeks, never having previously employed any other instrument. The case was examined a few days ago by Drs. HORNER, HAYS, and BRYANT, when the truss was removed, and the patient was permitted to cough, without experiencing any descent of the bowel. The hernia has not been down since the first application of the truss.

“The Committee requested Mr. CHASE to remove the truss, which he did. The parts beneath the pad, and for some distance above it, were evidently in a state of considerable irritation. Some scattered ecchymoses were visible, and slight contusion was obvious over several square inches of surface. The temperature of the skin was but little exalted, the swelling was very slight, there was no complaint of pain on pressure, and no febrile re-action. The boy says that the instrument has never given him much pain, but now and then some uncomfortableness, which has induced him to slacken the perineal strap occasionally, so as to alter the bearing of the block; hence the great extent of the irritation. The action of the block has not extended to the external ring, into which the tip of the little finger can be introduced by reverting a portion of the skin of the scrotum, but the upper two-thirds of the abdominal canal, and the parts around the internal ring are completely involved in the marks of irritation.

“The Committee did not think it right to subject the patient again to the danger of coughing, so early in the progress of the treatment, and the case is therefore left *sub-judice*.

“Oct. 13.—This boy appeared before the Committee; truss removed; the ecchymoses have become less apparent; the redness continues; there is a depression of the integuments where the block rests, obviously result-

ing from some lasting compression in the sub-cutaneous cellular tissue. Truss re-applied.

“*Dec. 5th.*—This case has been constantly under the eye of the Committee from the last date, and the hernia has never descended. Leaving off the truss with impunity for short periods of time, while running about, he still re-applied it, by the special request of his father, when wandering long distances into the country. At the date of the last note, Nov. 24th, there was no appearance of tumour; there was slight blueness of the integuments on the affected side, but no other difference between the two sides was observable.

“Your Committee have the most favourable anticipations in this case.”

*Continuation by the Author. April 2, 1836.*—Master S— was examined this day in the presence of Dr. R. COATES. No distinction can be observed between the two sides. The patient, from his present feelings, is not aware of his ever having laboured under hernia. He has been without his truss almost constantly, since the Report of the Committee. Truss finally removed.

*July 12th.*—Since the first of this month the patient has been examined by Drs. R. COATES, and GAGE of New York, by whom he is pronounced cured.

CASE II. (*Case III. of the Committee.*) “*October 7th, 1835.* J—B—, a gentleman well known to many of the members, aged about thirty years, in good general health, has been subject to regular inguinal hernia on the right side, for about four months. He cannot account for the accident. Soon after the appearance of the tumour, he requested the opinion of Dr. HORNER, who pronounced upon the character of the disease, and recommended him to the care of Mr. CHASE. The truss, with Hood’s common inguinal block, in default of Mr. CHASE’s, was



first applied on the 22d of June, and MR. CHASE's block was substituted as soon as prepared, about two weeks after the commencement of expulsion of the bowel.

“The truss was removed to facilitate the examination. The lower part of the abdomen was rather unusually prominent, particularly in the space midway between the superior anterior spine of the ilium and the symphysis pubis, on each side, where it swelled obviously outward, like a spherical tumour. This prominence was not produced by adipose matter, or by any other cellular tissue, but was plainly the result of a slight enlargement of the abdominal cavity in this region. The skin above the brim of the pelvis was easily depressed into the external ring by the finger, so that it was altogether unnecessary to revert the skin of the scrotum in order to facilitate the examination of this outlet.

“The external abdominal rings were unusually large. The point of the index finger entered them readily, and to such an extent that it could be made to engage itself beneath the outer edges of the rings, which were thicker and more abruptly defined than usual. The rings were not only broader, but much longer than common; probably from a deficiency of the transverse fibres which should strengthen the connexion of the two columns of the tendon of the external oblique muscle, at the summit of each ring. It is obvious, from these remarks, that the patient had a predisposition to inguinal hernia, probably from his birth.

“The external ring on the right side had not been in any degree affected by the pressure of the truss, but the parts covered by the block presented an erythematous blush, which indicated considerable irritation. This irritation extended over nearly the whole length of the



abdominal canal, and to a considerable distance around and above the site of the internal ring. The patient did not complain of any notable inconvenience from the pressure of the block.

“The index finger was placed above the external ring, and the patient was caused to make strong and repeated efforts to cough. This caused a sensation of a strong impulsion directly outward from the abdomen, to be felt by the finger; but no tendency to dilation was observed in the abdominal canal. Precisely the same results followed the experiment when essayed in the same manner on the sound side.

“It is somewhat difficult to account for the security of the bowels in the present state of the case. It is true that the course of the spermatic cord through the canal, is rather more distinctly traceable on the right side than on the left, and the tendinous covering of the canal on the same side feels somewhat harder to the touch; but there is no appreciable thickening of this part, nor is there, as yet, the slightest condensation of the skin or subcutaneous cellular tissue. The former, indeed, glides over the surface of the facia beneath, with rather unusual facility.

“*Oct. 24.*—The patient is still under treatment, but has made several efforts while the truss was removed, without any protrusion of the bowel, and this accident has never occurred since the first application of the truss.”

*Continuation by the Author.*—*July 16.*—Examined this case to-day. The parts about the rings, and the rings themselves, on both sides of the abdomen, appear perfectly similar. The patient has left off his truss occasionally within the last two months without intermitting his usual avocations. He has been in the country

for a few weeks, and during that time has occasionally but not constantly, worn his truss when at work in the harvest field. Habit has rendered the instrument an agreeable support to the parts. This case is regarded as radically cured.

CASE III. (*Case IV. of the Committee.*) “A rude boy, aged about nine years, labours under inguinal hernia on the left side, which was caused by pertussis when he was two years old. The boy suffers very little inconvenience when the hernia is down, and seems to care nothing about it. Ring rather large. HOOD’s truss, with a block now in our possession, was applied by him, *March 31st, 1835.* It was worn constantly for two months; then, occasionally, until the present time. During this period of time, the bowel has descended occasionally, but has been reduced by the patient or the operator with the utmost facility.

“*Oct. 10.*—Yesterday the patient was produced before Dr. ASHMEAD, who found a portion of intestine in the sac. The block of Mr. CHASE, i. e. the common inguinal block, will be applied to-day, for the first time. The patient had worn other trusses, none of which prevented the descent.

“*Oct. 13.*—The Committee examined C— this day. The truss had not prevented the descent. The bowel was returned by Mr. CHASE, and the truss re-applied. The boy is extremely careless, and was not himself aware of the descent. He had been exercising himself violently in trundling a hoop, and had neglected an appointment made for the purpose of having his truss properly adjusted.

“*Dec. 5.*—This patient has been frequently before the Committee, and the retention of the bowel, since last date, has been perfect. Considerable irritation of the

parts beneath the block are still subsisting, and slight efforts without the truss do not produce protrusion. The case looks very favourably, when the habits of the boy are taken in account. He still wears his truss."

*Continuation by the Author.*—May 30th, 1836. I examined Master C., this day; not having seen him before since the Report of the Committee. He had left off the truss, but neither the boy nor his father could say precisely when. Previous to the first application of the truss, Dr. MUTTER requested that he should witness the case, with its treatment and result. Accordingly, he saw him several times during the treatment, and examined him this day. He pronounced the case "successful." The two sides had nearly a similar appearance, but Dr. MUTTER was of opinion that the parts on the side where the hernia had existed, were a little thickened. This patient had some enlargement of the spermatic cord, which might, in part, account for this thickening. It still continues, and was sufficiently obvious when the truss was first applied.

CASE IV. (*Case V. of the Committee.*) "Oct. 10th, 1835. Mr. ———, a gentleman of high respectability, well known to one of the members of the Committee, was examined by the Committee on this day. Age about thirty-five years.

"The patient suddenly became subject to hernia," i. e. common inguinal hernia, "in running after an omnibus, between three and four months ago. He has worn CHASE's truss, with the common inguinal block, for about three months uninterruptedly. The bowel has never descended since that time.

"*Condition of the parts.* There is a well defined redness of the integuments, at the part covered by the block, but there is no trace of condensation in the subcutaneous

cellular tissue. The external ring on the affected side seems to be a very little contracted and firmer, for which fact it is difficult to account, as the block does not act at this point. It may possibly result from a congenital peculiarity. The sliding of the skin over the abdominal canal, is not restricted.

“*Tests of radical cure.*—The patient was examined by DR. HARTSHORNE, a few days ago. His truss was removed, and he was requested to cough, which he did, as he states, repeatedly and violently, while the doctor made every necessary examination of the parts. Dr. H. then stated, that he saw ‘no marks of any thing wrong about the case.’ Slight efforts to cough were made before the Committee. There was evident propulsion of the integuments immediately over the internal ring, but they were not appreciably greater on the diseased than on the sound side.

“The probabilities of radical cure, in this case, are very strong; but the Committee, not wishing to hasten Mr. CHASE, in subjecting the case to any farther test, by their advice, simply requested to see the patient occasionally, after the final removal of the truss. Truss continued.

“*December 5.*—There has never been any return of the protrusion since last date. The patient has attended to his business, without a truss, for some weeks past. The probability of radical cure in this case is *very strong.*”

*Continuation by the Author.* No regular notes of this case have been preserved, but I have seen the patient repeatedly since the Report of the Committee. Some time after the 5th of December, 1835, he called upon me several times under the impression that his bowel had protruded. Nothing in the condition of the parts



seemed to warrant this idea; but he preferred the re-application of the truss, which he still continues to wear. He appears to be somewhat hypochondriacal.

In this case, the obliteration of the mouth of the sac is doubtful; for, about six weeks ago, he called on me to examine him, and the sac was found somewhat distended with fluid, which returned into the abdomen on pressure; but this has since disappeared entirely. It is not uncommon for the sac to exhibit the presence of a considerable portion of serum, during the treatment of hernia, even when the retention of the bowel is perfect, and this appearance should not occasion any alarm.

CASE V. (*Case VI. of the Committee.*) “Mr. P—, a highly intelligent and athletic English gentleman, has laboured under inguinal hernia on the left side, for a number of years. The cause of the accident is unknown to the Committee. He had worn a variety of the most lauded trusses before applying to Dr. HOOD. No truss had ever retained the hernia effectively. He applied Dr. HOOD’s truss under his direction, and continued it for more than four months. This truss produced great pain, probably from pressure on the brim of the pelvis, and it did not effectually prevent the descent of the bowel.

“Oct. 13th, 1835.—Examined by the Committee. This patient is a remarkable example of muscular power, and his abdominal muscles are exceedingly strong—the abdomen is of an unusually rounded form, and there is a thick layer of adeps over the lower part of the abdomen, which is only partially absorbed under the pressure of the pad, although considerable irritation had been produced.

“The external abdominal ring cannot be distinctly felt, in consequence of the amount of adipose matter in the



subcutaneous cellular tissue. This is a very unfavourable case for the action of trusses, yet although no instrument previously employed had been able to retain the bowel under ordinary exertions, the patient has had no protrusion since the first application of Mr. CHASE's truss, which has been steadily worn since May 20th, 1835, and he has led for a considerable part of this time, the life of a hunter, leaping fences, riding desperately, and following the favourite pursuits of an athlète. He is enchanted with the instrument, and protests that he is generally insensible of its pressure.

“*Dec. 5.*—This patient has not appeared again before the Committee, probably because much of his time is occupied in field sports.”

*Continuation by the Author.*—When seen in March last, this patient was not wearing his truss. No return of the hernia took place, and soon afterwards he left the city for New Orleans, without applying for further advice. He is now in that city, and is believed to be radically cured.

CASE VI. *By* DR. ASHMEAD. (*Case IX. of Report.*)  
“Master Ruth, aged six years, with a robust constitution, has congenital inguinal hernia of the right side. It is large, and passes into the scrotum. The external ring on both sides large and relaxed, the patient having tried two or three different forms of trusses, directed by physicians, and these failing to retain the bowel for a single day, and having suffered severely from them, the mother then despairing of a cure, or relief, permitted the lad to go without any support of the parts. But the boy having suffered symptoms of strangulation several times, I was called to see him, and directed Mr. CHASE's truss to be applied. At the time the bowel was readily restored, but on removing the thumb from the ring, while the pa-

tient was in the erect position, without any effort being made, it immediately fell down to as great an extent as before. The truss was applied by Mr. CHASE, on Oct. 16th, 1835, and it has completely and uniformly retained the bowel within the abdomen, so that it has not once since descended. And now, December 4th, the bowel does not descend, even when the truss is removed, and the patient stands erect and still; though so short a time has elapsed since its adjustment. I thought it wrong to make him cough or exert his abdominal muscles, to show how far it would be retained. The sac is thickened and remains down. Slight inconvenience was at first felt from the pressure of the block, though the spring is not stronger than those in general use, (perhaps not so strong.) It produced inflammation of the skin beneath it, which was moderated by several folds of linen under the pad. Now, no inconvenience is felt, and it has ceased to irritate the parts. In this case the block is placed over the external ring and lower half of the abdominal canal. No evidences of thickening of tissues or adherence of parts about the external rings as yet exists. The case is still under treatment and observation; and its future result will be communicated when sufficient time has elapsed to judge of its final success."

*Continuation by the Author. March 17th, 1836.* I examined this case in the presence of the young lad's mother, who informed me that she had, on two former occasions, removed the instrument for short periods. The truss was again removed; the parts about the rupture appeared more thickened than usual. I applied a second truss which covered the site of the internal ring more accurately than the first had done.

*July 24.*—Examined the case; no alteration in the

appearance of the parts ; patient has left off his truss occasionally.

CASE VII. (*Note II. of the Report.*) “*From notes by Dr. GERHARD and the Committee.* Mr. P——, at the Pennsylvania Hospital, who had worn HOOD’s truss with an inguinal block for some time, and who is said to have been considered radically cured by Dr. HOOD and Dr. BODDER, had a recurrence of the rupture after the close of their treatment. In October last, while using Mr. CHASE’s truss, after the relapse, he was presented before the Committee by this gentleman, to rebut the charge that his blocks were incapable of producing sufficient irritation to secure adhesion in the parts beneath ; and also to show that the most severe inflammation which could be produced by the instrument without gross mismanagement, was not productive of danger to the peritoneum. At the time of the examination, all the parts covered by the block were more or less excoriated, and in a high state of inflammation, so that one of the Committee thought there was danger of the formation of an abscess in the part. The patient did not complain of any abdominal symptoms, nor of very great pain from the pressure. The force of the instrument was afterwards diminished, and the inflammation soon subsided. The Committee has seen several instances of excoriation from the action of different blocks, but none in which serious inconvenience was produced by this cause.”

CASE VIII. (*Note IV. of the Report.*) “A man of middle age, with inguinal hernia, was examined by the Chairman, about the end of Oct. last. He had one of HOOD’s original blocks in action at the time, and stated that he had worn it for a considerable time. The

direction of the shoulder of the block was nearly perpendicular, and, in the opinion of the examiner, it was too near the mesial line of the body to act upon the upper end of the inguinal canal. It is not recollected by whom the instrument was applied, but, according to the statement of the patient, it had always retained the bowel. It should be borne in mind, however, that it is difficult to detect a small protrusion of intestine, confined to the upper end of the canal. The truss was removed by MR. CHASE'S order, the patient being then about placing himself under his care; and so great was the absorption of the subcutaneous matter, and the integuments, that the skin was brought into apparent contact with the tendons beneath; and it is the opinion of the examiner that, had the pressure been injudiciously continued, the integrity of the tendons themselves would have been threatened. The depression thus occasioned was greatest at the prominent extremity of the shoulder of the block, and continued—gradually becoming less marked—for about two-thirds of its length upwards. The depression was very narrow, and the parts about the most prominent line of the block were alone imbedded in it. Around the edges of the block there was some swelling, apparently produced by a deposit of some kind in the subcutaneous cellular tissue. The patient has not since been seen. This note is drawn out from memory."

CASE IX. (*Note V. of the Report.*)—"A patient, with inguinal hernia, was recently presented before the Chairman. He stated that he had worn a truss with one of the wooden blocks, until it had produced a degree of absorption described as equal in extent to that mentioned



in the preceding note. He had then slackened the instrument, and finally relinquished its use for some time. At the time of the examination, the parts which had been compressed, had resumed their usual level and aspect. The adipose matter had been re-deposited in the subcutaneous cellular tissue, and no obvious induration about the canal or the rings could be detected.

“This note is introduced to show that adhesions or indurations are not the invariable result of the action of solid pads. The Committee has seen, as yet, *no conclusive evidence that they are ever so produced*. This note is also drawn up from memory.”\*

CASE X. (*Case I. of the Committee.*)—“October 5th, 1835. P—— B——, a vigorous seaman, aged 58 years, has been subject to ventro-inguinal hernia since May, 1825. The bowel descends into the scrotum, and the hernial tumour is said to be enormously large occasionally. The sac is much thickened and extensive, constituting, by itself, no inconsiderable tumour when the hernia is reduced.

“The accident occurred suddenly, while raising an anchor, the patient being at the time submersed in water. The bowel has never been strangulated. B—— is very subject to attacks of colic, but these appear to have been unconnected with any mechanical obstruction of the intestine, as they occurred not less frequently before the accident. A truss, with CHASE’S ovoidal block, has been applied since the 15th of July. Two attacks of colic have taken place since that time; and on each of these occasions the pad was removed, and the hernia descended. The last descent took place on the 28th of September,

\* No further observations have been made on the three last cases.



and then, for the first time, the patient was unable to return the hernia without assistance. He sought aid from MR. CHASE next day, and the intestine was reduced with some difficulty, produced, as MR. C. supposes, by the gradual contraction of the ring under the course of treatment. The mouth of the sac was originally so large that the skin could be depressed into the abdomen until the patient could pass three fingers through the ring. After the return of the protruded parts, on the 29th ult., he could not detect the aperture. He has complained, occasionally, of some slight excoriation from the action of the block, but this has never occasioned severe pain. Such is the statement given by the man himself, corroborated by MR. CHASE, and the record book of cases.

“The Committee do not think it warrantable, in justice to the patient, to make any examination of the parts beneath the block, until time has been allowed for a more complete condensation of the parts. MR. CHASE scarcely anticipates such a cure in this case as will ever enable the patient to dispense entirely with a truss; particularly on account of the nature of his occupations, which are very laborious.

“Oct. 13.—B. appeared before the Committee. A very considerable descent of the bowel had taken place from beneath the block. He states that he was yesterday engaged on an election frolic, walked a greater distance than he had done at any previous time for many years, and drank ‘a great deal too much.’ The truss was removed, the bowel reduced by MR. CHASE, and the ring examined by the Committee. The hernia was direct, and the orifice large enough to admit two fingers.

“*Dec. 5.*—Since the last date, this patient has been presented before the Committee twice; his bowel has been pretty steadily retained by the truss; but another year, at least, will be required to enable the Committee to judge of the full effect of the treatment under such unfortunate circumstances. At present, the case is regarded as incapable of radical cure by any means; but the patient enjoys more comfort than he had before experienced at any time subsequent to the accident; and he is now able to attend regularly to his business. Within the last few days he has used a block similar to the smaller wooden plano-convex blocks, which MR. CHASE employs in umbilical, ventral, and occasionally in ventro-inguiual hernia. Of the propriety of the latter change, the Committee will express no opinion.”

*Continuation by the Author. July 12th.* Within the last few days I have examined P—— B—— very carefully on two occasions. Yesterday the parts were inspected by DRS. HORNER, HAYS, and R. COATES. The orifice was found a little larger than the external ring in its natural condition. One of the gentlemen just mentioned, was convinced that the neck of the sac had united by adhesion; there was so much thickening and softening of the spermatic cord, that this part might have been mistaken for a portion of bowel, unless very closely examined. The sac was still very thick, but perfectly flaccid, and reduced to one-third of its original dimension.

The plano-convex block, mentioned by the Committee at the close of their Report, retained the bowel imperfectly; and in a few days the newly-contrived ventro-inguiual block was substituted for

it. Since that time there has never been any protrusion, nor have there been any symptoms of colic; and within the last month he has frequently left off his truss with impunity. He has walked up and down stairs, and about the yard without it, and once, very imprudently, he went to a fire, forgetting to re-apply it. He now follows his professional occupations with comfort and ease.

The pressure of the instrument gives him no inconvenience whatever, and he is even unconscious of its presence. When the advanced age of the patient is taken into consideration, with the enormous size, and long standing of the tumour, much more has been accomplished in this case than could have been reasonably anticipated.

CASE XI. (*Case VII. of the Committee.*)—By DR. I. PARRISH. *Ventro-Inguinal Hernia*. “— —, aged about 33 years, a sugar refiner, accustomed to lifting heavy weights, has had a rupture for seven years. The first descent occurred in the act of lifting a heavy barrel. When he ascertained the nature of the injury, he bought a truss of a druggist, which he wore for about a year; this succeeded in retaining the parts, and on removing it, he found that no protrusion took place. At the end of a year, thinking that he was cured, he threw aside the instrument, and continued his laborious occupation without it. In about two months, while lifting a heavy weight, he had another descent. He had recourse to trusses again, but never could procure one which he liked as well as the first. He frequently experienced difficulty in keeping up the bowel. The hernia continued in this situation until May 13th, 1835, when he applied CHASE’S truss.

“At this time the surgeon thought that the rings were

unusually large, and near to each other. The health of the patient was much impaired; he had nausea and eructations, particularly after eating; constipation of the bowels; general debility, &c.

“He states that he experienced considerable pain and soreness for some time after the first application of the instrument. This subsided, and lately the truss has been very easy. He has been in the practice of removing it at bed-time, for some weeks.

“*1st Mo. 24.*—Saw him in the evening; he had removed the instrument about two hours before, and had walked some squares; he has removed it for a few hours once before, without a descent. There has been no appearance of the tumour. There has been a slight increase in the natural hardness of the parts about the rings. The passage of the finger through the abdominal rings appears to be obstructed. He states that his general health has been much improved since applying the instrument.”

*Note by the Author.*—No further evidence with regard to this case has presented itself, as he has not called on DR. PARRISH since the case was drawn up by the Committee.

CASE XII. (*Note I. of the Committee.*)—“Major W., a gentleman of about 60 years of age, has had for many years a large, direct or ventro-inguinal hernia, with an orifice of very considerable size. The hernia has given great distress, disabling him from business and sometimes confining him to his bed. The patient, before applying to MR. CHASE, had worn a variety of trusses “with little or no benefit,” to use his own language. “For upwards of twelve weeks past it (the hernia) has been uniformly retained by MR. CHASE’s inguinal pad.” He can now walk the room with the truss off, and without producing



any appearance of the hernia; which could have been scarcely possible, even by accident, before the application of this block. With the instrument applied, he is able to “walk a considerable distance with comparative ease and firmness.” Neither the patient nor his surgeon have relinquished their hope of a radical cure in this very unpromising case; and the Committee are unwilling at present, to express any opinion on the probability of such an event.”

*Continuation by the Author.*—*July 26, 1836.* The case was examined in the presence of DR. R. COATES. The ease with which the truss is worn, and the perfect comfort enjoyed by the patient, have fixed him in the determination of continuing its use for life, as his age renders him unwilling to test the question of radical cure. Since the Report of the Committee, he has frequently left off his truss for short periods of time, and been engaged in travelling for some months: he has experienced no inconvenience, either from the instrument or the disease. He is now about undertaking a fishing and hunting excursion to the interior of the State.

CASE XIII. (*Case VIII. of the Report.*)—*From notes by MR. CHASE. Examined and approved by DR. B. H. COATES.* “*Oct. 13th.* I visited this day, in company with Dr. B. H. COATES, Miss — —, aged about twenty-eight years, and found her labouring under a femoral hernia on the left side. The protrusion was about as large as a walnut. Cause unknown. The accident occurred about two years ago. The patient has suffered several times from obstruction of the bowel; she has been obliged to confine herself repeatedly to her bed, and has suffered much pain and great inconvenience from the disease.

“15.—On examination, we found the protrusion of



the bowel greater than it was on the 13th. By steady taxis, the bowel was reduced in four or five minutes, and the truss with the femoral block was applied in the presence of Dr. COATES.

“16.—Visited the patient with Dr. C. We found the patient comfortable; she complained of a little soreness.

“19.—Up to this period the patient has laid her truss aside at night. She found the tumour slightly apparent. It was much smaller in the morning, nor did it give her pain on its appearance, as it had done previously to the application of the truss. Directed her to wear the instrument day and night.

“21.—We again visited the patient, and found her attending to domestic affairs. The bowel had not appeared since the last visit.

“26.—The patient has attended church. She walked much on Monday and to-day. She complained of soreness beneath the block.

“30.—The bowel has not passed down; the soreness has in a great measure subsided.

“Nov. 10.—The truss is now worn with ease.

“30.—The truss is still worn with ease. It is thrown off at night.”

*Continuation by the Author. July 15.*—This patient has been examined twice since the Report. She still wears her truss. There has been no protrusion of the bowel in the interval.

CASE XIV. (*Case IX of the Committee.*) By DR. ASHMEAD. “— æt. about thirty years, good constitution, sedentary habits, occasionally uses violent exercise, small femoral hernia of left side for two years.

“For this affection the patient has tried a variety of trusses, with strong springs and soft large pads, all of

which failed in retaining the protruded intestine; so that he despaired of ever being cured. In June last, Mr. CHASE applied his truss, which retained the bowel constantly and perfectly, and gave much less pain than the others had done. He says he suffered very little inconvenience from it; indeed it now sits so easily that he hardly knows when it is on. It is now three months since its first application; he only wears it when using violent exercise, as in gunning. Last week, while gunning, he forgot to apply it, he jumped over fences fearlessly without any descent being produced. Coughing appears to give to the finger placed over the hernial orifice a very slight impulse. The skin over this spot bears marks of pressure. It is discoloured, hard, and drawn backward and slightly upwards, as if the soft parts beneath had been absorbed, or as if they were adhering closely to the parts beneath; and this appearance presents a striking contrast to the corresponding parts on the opposite side."

*Note by the Author.*—This patient relinquished his truss about the time that the foregoing case was drawn out by DR. ASHMEAD. He has never experienced any return of the disease, and is considered radically cured.

It is stated in the earlier part of the work that it is often difficult and sometimes impossible to distinguish between femoral and inguinal hernia in the female. The following note from the Report of the Committee is introduced in support of the foregoing remark.

CASE XV. (*Note VI. of the Report.*)—"Within a few days, the Chairman of the Committee was called in consultation with a medical gentleman from the country, to see a lady labouring under a small hernia, believed to be femoral, but its precise character could not be positively determined, owing to the sex and

embonpoint of the subject. The edge of Poupart's ligament could not be distinctly felt, and the case may possibly prove one of direct ventro-inguinial hernia. When reduced, the rupture always returned, if the patient rose from her couch. CHASE's truss, with a small femoral block, was applied by the Chairman of the Committee, and during various efforts to test the security of the parts, the retention appeared perfect. It is very improbable that any soft pad of similar dimensions could have produced such security. The patient left the city almost immediately, and her physician has not made any further communication on the subject."

The cases reported by the Committee being completed to the present time, others will now be added from my own notes; and when the patients have been examined by other practitioners, their names will be quoted.

CASE.XVI. *Common inguinal hernia on the right side.* Mrs. —, aged 27. Constitution vigorous. Patient arrived from Ireland in 1834. She has been accustomed to much exercise. While preparing for her voyage she was suddenly seized with pain in the right inguinal region, and a small tumour appeared there; but the complaint received no attention until October 1st, 1835, when, having suffered several times from partial strangulation of the bowel, she consulted DR. ISAAC PARRISH, by whom she was referred to my care.

October 14.—Saw the patient for the first time. Tumour about as large as a hen's egg; painful to the touch. She had walked several squares in the morning; states, that after such exercise she is ac-

customed to faint, and is generally compelled to lie in bed two or three hours, to recover herself.

20.—Applied the common inguinal truss, in the presence of **PROF. HORNER**, and **DR. CRITTENDEN** of Cincinnati, who kindly accompanied me. **DR. HORNER** reduced the bowel. The instrument being applied, the patient rose from the bed. The retentive power and adaptation of the truss were fully tested and approved.

21.—Called, and found the patient attending to her domestic concerns. The truss gave no pain, and occasioned but very slight soreness. Patient says she feels comfortable.

22.—Considerable irritation beneath the block.

24.—Patient complains of soreness—did her family washing this day.

26.—Examined the parts; found them considerably inflamed, particularly above the pubic bone. The patient does not complain of the pressure; has been to market to-day.

31.—Removed the block and substituted one rather larger.

*November 10.*—Instrument worn with ease. The retention has been perfect since the first application.

*March 4, 1836.*—Instrument discontinued.

30.—Examined the patient; no perceptible difference between the two sides. She is now, by calculation, in the seventh month of pregnancy.

*April 11.*—Confined to her bed with false labour pains.

19.—She has had an extensive abscess in the left mammary gland, which I laid open this day, **DR. R. COATES** in consultation.

*May 4.*—At 2 o'clock, A. M., the patient was taken in labour; the pains were severe. After the rupture of the membranes the labour was very rapid. It terminated at 5 o'clock, P. M.

5.—The patient had severe after-pains during the night.

11.—Visited the patient in company with DR. SMART, of Maine. Found her going about as usual. DR. SMART pronounced her free from rupture.

*July 11.*—The patient continues perfectly well.

CASE XVII. *Common Inguinal Hernia, of the right side.* Mr. A., age about 24 years. Cause and duration of the accident unknown. By occupation a plasterer.

This patient commenced the use of HOOD'S inguinal truss, under the direction of the inventor, on the 10th of May, 1835, and continued it until he came under my care in the month of June following. The bowel descended frequently while this instrument was in use; and on examination, I found that the truss-block did not protect the internal abdominal ring. The instrument was removed, and my own common inguinal truss applied.

Saw the patient occasionally during a few months; after which he left the city.

*May 12, 1836.*—Patient returned to the city. There has been no protrusion of the bowel, and the instrument is worn with great ease.

*July 16.*—The truss has been worn day and night. There is no considerable absorption of the subcutaneous fat and cellular tissue. The patient has led a laborious life, and has had no protrusion of the bowel since the first application of the instrument. The



external rings were both unusually large by nature. No difference between the parts about the two internal rings.

This case is considered as radically cured; but the timidity of the patient, and the facility and comfort with which he wears his truss, (the instrument having a weak spring,) lead him to insist upon continuing the use of the instrument.

CASE XVIII. *Common Inguinal Hernia of the right side.* Master E—, age 12 years, constitution vigorous frame slender; accident occurred several years ago. Attributed by the parents to a fall from a fruit tree, but the patient states that the tumour first appeared during a ride on horseback soon after the fall.

*November 27.*—Applied the common inguinal truss.

28.—Truss worn during the night. Patient slept well.

*December 4.*—Parts beneath the block slightly reddened.

*April 1.*—Examined the case; no perceptible difference between the two sides; the retention perfect from the first. He has indulged in his usual sports without restraint, during the frost and snow of last winter. States, that since the four or five first days of the treatment, he has been scarcely conscious of the presence of the instrument.

*June 22.*—Examined in the presence of DR. R. COATES. Both sides present, in all respects, the same appearance. Patient has frequently laid aside his truss for short intervals; has bathed in the Delaware, and has used other exercises without it. DR. COATES advised the discontinuance of the truss, believing the case to be radically cured.

CASE XIX. *Double Inguinal Hernia*.—Mr. —, carpenter, age 30 years, constitution rather feeble; a very laborious man. Cause unknown; accident occurred many years ago.

October 26, 1835.—Examined this patient, who was recommended to my care by PROF. HORNER. He had worn a variety of trusses, some of which had retained the hernia. Applied two single common-inguiual trusses.

29.—The patient had been allowed to remove the instruments every night, to be re-applied, agreeably to directions, in the morning: this day he attempted to adjust them himself; and on rising from his bed, a slight descent of the bowel appeared on the right side.

The patient was desired to wear the instruments constantly, which he did until January 20th, 1836, nothing of interest having occurred in the mean time.

January 20.—The instruments were removed. The parts about the two inguinal regions appeared to be in a perfectly natural condition—The finger could not be made to pass either of the external rings—Directed to lay aside the instruments at night, and to re-apply them in the morning himself.

July 2.—Examined the case again—No accident has happened—Directed to continue the trusses a few weeks longer, as a precautionary measure.

This case I believe to be radically cured, but I do not think it prudent to allow the fact to be tested for some time.

CASE XX. *Direct inguinal hernia of the right side*.—Master W—, age 10 years—Accident occurred 6 years ago. Cause unknown. This young gentleman's father had spared no expense in obtaining for him the

best instruments, none of which permanently retained the hernia.

*December 13, 1835.*—Ventre-inguinal truss applied.

16—Patient has suffered no inconvenience from the truss—Retention perfect.

*January—1836.*—Skin inflamed beneath the block.—Patient complained of some soreness when the instrument was removed for examination.

*April 2.*—Instrument removed in the presence of DR. JOHNSTON, one of the Resident Physicians of the Blockley Hospital. A distinct depression of the skin was seen on the parts covered by the block, and it included the whole route of the inguinal canal and extended to the edge of the pubis. The bowel had never been down since the commencement of the treatment.

*June 20.*—Examined the case this day—The abdominal rings on both sides appear alike—There is still some slight depression of the parts pressed by the block—He has bathed frequently in the Delaware without his truss—Feels no inconvenience from his former rupture—Case considered as radically cured—but the patient still generally wears his truss at his father's request.

This patient has been under the eye of DR. KLAPP from the commencement.

CASE XXI. *Direct inguinal hernia, of the left side.*  
E—B—, stone-cutter—age 45 years—A strong man, accustomed to great exertion, but having had a fracture of the patella, he has recently avoided lifting heavy weights by the direction of DR. HARTSHORNE. This patient is asthmatic—Cause—coughing in an attack of asthma—Accident occurred four years ago—Tumour large—Patient had worn one of the old fashioned trusses, (see fig. 31, p. 45;) but the bowel frequently

escaped from beneath the pad—He consulted DR. TURN-PENNY, by whom he was referred to my care.

*October 28.*—1835.—Examined the case for the first time—The external ring was unusually large, admitting two fingers—Ventre-inguinal truss applied.

30—Since the application, the bowel made a partial escape during a coughing-fit, but was returned by the patient himself—Substituted another truss with a stronger spring.

*November 5.*—Yesterday evening the patient was seized with a paroxysm of coughing, and a slight escape of the bowel took place. The pressure of the block was again increased by bending the neck of the spring, and its margin was also more nicely adapted to the edge of the pubic bone.

*November 12.*—No further descent of the bowel has taken place.

Here the regular entry of the notes ceased, because nothing interesting occurred.

*July 11, 1836.*—The patient examined in the presence of DR. R. COATES. The retention has been perfect since the last date. The patient has been in the habit of taking off the truss at night, and re-applying it before rising in the morning. About four weeks ago he laid aside the truss without orders, and continued his usual avocations for ten days. I re-applied it, and ordered its continuance; but the patient again threw it off at the end of four days, and has not since employed it. He has attended to all the duties of a master stone-cutter, without the slightest inconvenience during the whole period. The ring is contracted to the natural size, rather unusually well defined, but feels somewhat less resisting than usual at its centre. Advised the patient to con-

tinue the truss, as a precautionary measure, for a few months longer.

CASE XXII. *Common Inguinal Hernia on the right side.* Mr. —, age, 59 years. This gentleman had been under treatment for a long time, and had been subjected to the operation of the most lauded instruments heretofore in use. He had worn trusses armed with several forms of wooden blocks, under the direction of a practitioner in this city, by whom he was pronounced cured; but the bowel continued to protrude at all times, upon any slight exertion. No instrument had ever retained it with certainty.

*February 19, 1836.*—Applied the common inguinal truss.

21.—Up to this date the patient suffered no material inconvenience from the truss. He had twice laid it aside at night, and re-applied it before rising in the morning. The parts subjected to pressure, and particularly those about the internal ring, had been very red from inflammation, but had not interrupted his usual avocations.

*April 12.*—The truss is now worn with great ease; the patient is not sensible of its presence, unless his attention is called to it. He has worn it night and day since the last date.

*May 5.*—This morning the patient, while engaged in active business, broke his instrument. He continued his occupation through the day, without any descent of the bowel or sensation of weakness at the part affected.

*July 26.*—The patient has never required medical advice since the last date. He has recently gone to Paris, and it is not in my power to state whether he



continues to wear the instrument or not, though I consider the precaution no longer necessary.

CASE XXIII. *Old Double Inguinal Hernia become direct by time.*—DR. —, of Virginia; age, 55 years. Cause—the first hernia occurred in a long fox-hunt; the second was subsequently detected while in bed. *Duration of the disease*, twenty years.

These herniæ were both originally of the common inguinal variety, but both had become direct by long continuance.

DR. — had spared no time or expense in testing the best instruments, and had placed himself, whenever it was practicable, under the charge of the original inventors. None of them had retained the bowel for any length of time, and they had all given him great pain and suffering. During the last five years he had been compelled to lay aside all instruments, and had confined himself to his house and yard, except during an occasional ride in his carriage.

In May, 1836, he came to Philadelphia and placed himself under my care.

May 18—Examined the case for the first time—The aperture on the right side readily admitted the index finger up to the first joint—its course being still somewhat oblique, while that on the left would admit two fingers.

20—Reduced the hernia, and applied two single ventro-inguinal trusses which retained the bowels without difficulty. Some folds of linen were laid under the blocks.

21—The trusses had been discontinued during the night, but were re-applied before the patient rose.

22—Some redness beneath the blocks—Trusses re-applied in bed.

23—Patient had removed the folds of linen yesterday, and found the bare block more comfortable.

24—There has been no protrusion from the first, and having now perfected my double truss, I removed the single ones and applied it.

25—Parts considerably reddened on both sides—The patient being desirous of removing the instrument at night, I gave him the necessary directions.

26—Patient applied his own truss this morning—he complained of pain on the left side—I found the left block resting on the edge of the pubic bone, and re-adjusted it.

27—Irritation of skin nearly subsided—The instrument worn with more ease than the two single trusses.

28—The patient returned to Virginia.

This gentleman had laboured under dyspepsia and diarrhœa alternating with costiveness, colic, &c. These symptoms gradually subsided after the application of the instruments—The case is still pending, and is introduced to show the retentive power of the apparatus.

CASE XXIV. *Direct Inguinal Hernia.* Mr. B—, age, 30 years—accident caused from the stumbling of his horse; case of four weeks' standing.

This gentleman had long been a distinguished teacher in the city, but had been compelled to relinquish sedentary, for more active pursuits—He was recommended to my care by DR. EDWIN A. ATLEE—The bowel had penetrated the canal about midway between the two rings.

December 4, 1835—Applied the common inguinal truss—Saw the patient every third or fourth day for four weeks—There has been but little irritation, and

no excoriation at any time, from the pressure of the instrument.

After the instrument was properly adjusted, it was worn constantly for four months, since which, it has been laid aside occasionally at night.

June 4, 1836—Examined the patient—He is apparently cured—The retention has been perfect since the instrument was correctly adjusted, and the patient has been insensible of its presence during most of the time. He informs me that DR. ATLEE has seen him repeatedly during the treatment, and the Chairman of the Committee on hernia, is familiar with the case.

July 17—The patient called on me this day. He has relinquished his truss, and is considered radically cured.

CASE XXV. *Common Inguinal Hernia of the right side.* Mr. —, age, 28 years; constitution vigorous; by profession, a currier. Duration of the accident six years. Cause, working at the board.

In May, 1835, this patient commenced the use of my common inguinal truss, and continued under careful supervision for three months. He then left the city.

March 10, 1836.—This day the patient called upon me. He stated that there had been no protrusion from the first application of the truss. I examined the parts, and believing the cure to be complete, directed him to relinquish the instrument.

July 15.—He has had no return of the disease, and continues his business without intermission.

This case had been examined by DRs. HORNER and JACKSON.

CASE XXVI. Mr. M—, *Ventro-Inguinal Hernia of the right side*. Age, 61 years. Duration of the accident many years.

This old gentleman had tried a variety of trusses without permanent effect. At length he found that no instrument would retain the bowels, which were left in quiet possession of the scrotum for seven years.

*April 20, 1835.*—This patient came to the city and was directed to my care. The orifice was very large : three fingers could be readily introduced into the abdomen. The instrument was applied, and the intestines were retained with some difficulty.

*July 24, 1836.*—The case continued under my care for a few weeks after the last date. During the few first days of the treatment, two partial descents of bowel took place, after which the retention continued perfect until the patient left the city. I have frequently heard from him by letter or otherwise. His general health is greatly improved, and he now attends to his business without inconvenience, which he had been unable to do for five years.

This case was similar, in many respects, to cases X. and XII.; and, as in those, some time will be required to show the final result. They may be considered as interesting, as they tend to prove the retentive power of the instruments.

CASE XXVII. *Umbilical Hernia*. A child about two years old. Hernia appeared in the third month. Health good.

*February 15, 1836.*—I was first called to the case to-day. The rupture has been much neglected from the first; but the mother had attempted the treatment of the case by pressure with the hand, &c.,

without effect. The orifice is so large that the end of the thumb can be readily depressed into the abdomen. This unusual deficiency of the tendons, is the principal peculiarity of the case. An umbilical band depressing the integuments of the umbilicus about five lines, was applied.

20.—The bowels have been perfectly retained. There is slight redness of the skin.

*March 19.*—Instrument raised from the rupture. No escape of the bowel took place.

*April 8.*—Band removed. Child cried, and no protrusion took place. Band re-applied.

*July 16.*—Since the 12th the patient has not used the band. Considered cured.

The irritation produced in this case was never carried beyond a full degree of redness of the skin, and never occasioned material inconvenience to the child, who is now perfectly well, the parts having assumed their natural position.

CASE XXVIII. Mrs. —, *Umbilical Hernia*. Age, 55. Duration of the accident many years.

*May 21, 1836.*—Called to the case this day by DR. HAYS. The patient has laboured under a small herniary tumour at the umbilicus for many years, and the bowel had been imperfectly retained by means of a bandage only.

On the 25th instant, a sudden protrusion took place, increasing the size of the tumour to that of a quart mug, and apparently extending the orifice much beyond its previous limits. The tumour became very tender to the touch, and there was threatening of strangulation. DR. HAYS reduced the bowel, and I then applied an instrument to act as a temporary pro-



tection, until a truss armed with a block of sufficient size could be prepared. The woman was enormously fat, her abdomen measuring three feet ten inches in circumference!

30.—Having ordered an instrument expressly for this case, I applied it in the presence of **DRS. HAYS** and **R. COATES**. **DR. C.** examined the aperture, which was of an oblong form; and the rent or opening in the linea alba was at least two inches and a half long, by one and a half in width! The block required to retain the bowel was six inches in diameter! Much difficulty was experienced in adjusting the instrument, owing to the folding and doubling of the integuments and the empty sac, after the reduction; and some fear was entertained that the whole mass of sac and integument might be reverted within the abdomen by the action of the block.

After the application the patient was requested to rise, and walk about the room. In the afternoon she went down stairs and returned again. The retention was perfect.

*July 17.*—The case was carefully examined in company with **DR. R. COATES**. The orifice had contracted very much, and the sac had diminished in size. Some of the folds of skin had been for some time excoriated by the pressure of the block; but this accident was much relieved by dusting the surface with carbonate of zinc. The truss had been removed several times in order to wash the part; but this had always been done with great caution, and by my own hands, while the patient was in the recumbent posture.

*July 25.*—There has been no protrusion since the

first application of the truss, and the patient has constantly attended to her domestic concerns with ease and comfort. The contraction of the skin and sac, with the absorption of fat produced by the pad, has rendered a larger block desirable, and it is proposed to substitute one of seven inches diameter.

In addition to the surgeons already named, the case has been examined by DR. GAGE of New York, and by DR. BAIN of Baltimore.

CASE XXIX. Miss —, *Common Inguinal Hernia of the left side*.—Age, 28 years; Cause unknown.

December 20, 1835.—I found the patient labouring under strangulation. Taxis was used without effect at first, but with the aid of the measures commonly employed, it succeeded in a few hours.

22.—The proper instrument was applied this day.

July 20, 1836.—I attended this lady regularly for two months, and I have seen her occasionally up to the present time. She has had no protrusion of the bowel since the first application of the instrument. She has worn it without intermission until within the last two months, during which she has left it off occasionally. She has never complained of the instrument; and, although she has been left at perfect liberty to relinquish it altogether, whenever she pleased, she insists on wearing it to the conclusion of an entire year. The case is considered radically cured.

CASE XXX. *Common Inguinal Hernia of the right side*. Mr, —, a gentleman aged 28 years, accustomed to much exercise. Accident of more than two years standing. The patient had never worn a truss before he placed himself under my care.

In Jan. 1835, my common inguinal truss was first applied. I saw the patient frequently for the two first months; after which, he regulated the instrument for himself. He continued the use of the truss for two months longer, and then relinquished it without my advice.

*June 10.*—I saw the patient again. There had been no protrusion in the interval, but he complained of slight pain and a sensation of weakness in the part when he rode on horseback, or was driven rapidly over the pavement in a carriage.

*May 20, 1836.*—The patient came to me, stating that he believed there was a relapse of the disease, and that the bowel was in the scrotum. I examined the parts very carefully, and found the cure complete. The rings were perfect, but he had laboured under a slight cirsocele on the right side, which had been considerably aggravated by active exercise and the heat of the weather.

*July 20.*—The patient continues well of the hernia, and the cirsocele has been diminished under the usual treatment. He has never been examined by any other surgeon, having steadily refused to submit to such an exposure.

CASE XXXI. *Common Inguinal Hernia.* Mr. —, merchant, age, 27 years. Accident occurred when a lad at school; cause unknown. An instrument was applied as soon as the disease was discovered, and he had constantly worn some variety of the truss until he came under my care, Jan. 16, 1835; but his bowel had never been retained for any considerable length of time by either of them.

20.—The common inguinal truss applied.

25.—The patient has had one descent of the bowel

since the last date. An instrument with a stronger spring applied.

*November 13.*—No protrusion has taken place since last date. Truss worn with ease. The parts have exhibited scarcely any marks of irritation externally.

*July 25, 1836.*—I have not seen the patient since November last. DR. HULME met with him to-day. He stated that he relinquished the truss six months ago. He has been travelling for some months on horseback, in the western country, often at the rate of fifty miles a day, and says that he has not suffered any inconvenience from his long journey, nor has he perceived any symptoms of his former disease.

I shall give, under the head of diseases resembling hernia, an example of the danger of careless examinations in forming a diagnosis in this disease; the following instance displays, in the strongest light, the impropriety of putting the business of applying trusses, into the hands of those who know nothing of surgery. The former was a proof that life may be endangered by mistaking hernia for other diseases; and the latter shows that the comfort of the patient may be sacrificed, and his condition rendered worse, by mistaking other diseases for hernia.

CASE XXXII. A—Y—, Esq., a gentleman of high standing from one of the Southern States, came to Philadelphia for the purpose of consulting me in relation to a supposed "scrotal hernia," with which he had been induced to believe himself affected.

About five years ago he consulted a gentleman, not of the profession, who acted as agent for the sale of a celebrated truss invented in New York; who, under the belief that the case was one of genuine hernia, applied the truss. The patient continued to wear it for

some time; but finding the disease greatly aggravated under its use, he at length relinquished it.

His disease still continuing, he applied for relief to a gentleman in Washington, D. C., who furnished him with MR. STAGNER'S truss. This instrument he continued to wear for several months, until the distress resulting from the complaint became altogether insupportable.

On examining the patient, I found that he laboured under an unusually extensive enlargement of the veins of the spermatic cord! He had cirsocele, and there were no signs whatever that hernia had existed in the case at any time!

This information being communicated to the patient, his joy and gratitude were as great as could well be imagined under such circumstances; for he had been harassed and annoyed for years, with even an exaggerated dread of strangulated hernia and the knife!

In closing the evidence here, it may be observed, that many other cases might be added, both in support of the retentive and curative powers of the instruments; but it is deemed unnecessary to increase the list. Those detailed have been given without any regard to the selection of the most successful; no case has yet been met with in which permanent retention has not been effected; and even in the very worst instances, there seems to be no reason for relinquishing all hope of ultimately accomplishing a radical cure.





21	M Boy		1	1	1							Leaping from a window.
22	F Forger	1	1	1	1							Unknown.
23	M Teacher					1					1	Unknown.
24	M Broker						1	1				Unknown.
25	M Boy	1	1									Unknown.
26	M Ostler	1	1									Unknown.
27	M Merchant	1	1									Unknown.
28	M Labourer						1				1	Unknown.
29	M Tinman						1					Shutting a window.
30	M Church						1					Unknown.
31	M Carpenter						1					Lifting.
32	F Nurse	1	1									Unknown.
33	M Lawyer	1	1									Unknown.
34	M Tinman	2	1	1							1	Unknown.
35	M Trunk-maker	1	1									Lifting.
36	M Farmer					1	1					Carrying grain on the shoulder.
37	M Mason					1	1					Leaping.
38	F Lady									1		Child-birth.
39	M Gentleman	1	1									Unknown.
40	M Dissector	1				1	1				1	Right side from jumping; left from lifting.
41	M Jeweller					1	1					Drawing on boots.
42	M Sailor					1				1		Raising stones.
43	M Factory lad	1					1	1				Unknown.
44	M Sailor						1					Carrying 200 weight up stairs.
45	M Hatter						1					Right, wheeling a heavy load; left unknown.
46	M Mason					2	1	1				Unknown.
47	F Child									1		Child-birth.
48	F Lady					1	1					



70 23	M	Gentleman	1	1			2	Unknown.
71 45	M	Medicine	1	1			2	Straining at stool.
72 26	M	Clerk	1	1			3	Lifting heavy boxes.
73 57	M	Planter	1	1			Many	Unknown.
74 30	F	Lady	2	1			1	Unknown—unmarried.
75 85	M	Gentleman	2	1			1	Unknown.
76 25	M	Merchant	1	1			Many	Unknown.
77 1½	M	Child	1	1			3 months	Appeared in the bath.
78 25	F	Confectioner			2	1	2	Over-exertion—married.
79 55	M	Farmer	1	1			120 & 5 m	Over-exertion.
80 50	M	Inn-keeper	1	1			6	Springing suddenly out of bed.
81 45	M	Book-seller	1	1			4	Unknown.
82 58	M	Cook			1		12	Lifting.
83 62	M	Carpenter	1	1			10	Coughing.
84 68	M	Farmer	1	1			1	Debility after long confinement.
85 25	M	Merchant	1	1			6	{ Hernia followed the descent of the testis, which took place at 19 years of age.
86 62	M				1	1	14	A fall—patient weighs 300 pounds.
87 28	F	Seamstress			1		4	Unknown—unmarried.
88 60	M	Merchant	1	1			15	Unknown.
89 42	M	Soldier	1	1			1	Patient sunk under a heavy weight.
90 27	F	Lady	1	1			12 & 5 m	{ Inguinal, from over-exertion—femoral from reaching upward—married.
91 27	M	Merchant			1		6	Arranging goods on high shelves.
92 7m	M	Child	1	1			8	Hard labour.
93 50	M	Carpenter	1	1			14	Leaping a brook.
94 37	M	Merchant	1	1			15	Lifting trunks.
95 27	M	Inn-keeper			1			

No.	Age in years.	Sex.	Occupation.	Congenital.	Inguinal.	Right side.	Left side.	V. Inguinal.	Right side.	Left side.	Femoral.	Right side.	Left side.	Umbilical.	Ventral.	Irreducible.	Double.	Duration in years.	CAUSES, &c.
96	27	M	Clerk	1	1													6	Unknown.
97	45	M	Farmer					1	1									10	Lifting heavy weights.
98	60	M	Gentleman					1	1									Many	Unknown.
99	55	M	Mason					2	1	1							1	20	Hard labour.
100	42	M	Carpenter					1	1								1	10	Heavy lifting.
<i>Totals,</i>				5	48	29	19	57	33	24	10	3	7	4	1	1	20		

*The following conclusions are deduced from the summary of the preceding Table.*

Of 100 cases of rupture, 20 were double—5 congenital—and 1 irreducible.

Of 20 cases of double rupture, 6 were ventro-inginal on both sides—6 were common inginal on both sides—2 were femoral on both sides—1 was ventro-inginal and femoral on the same side—2 were inginal on one side and femoral on the other—1 was ventro-inginal on one side and umbilical, and 2 were common inginal on one side and ventro-inginal on the other.

Of 120 ruptures, 48 were common inginal—57 ventro-inginal—10 femoral—4 umbilical, and 1 ventral.

Under the head of ventro-inginal hernia are included, not only those in which the bowel originally penetrated directly through the external ring, but those also in which the hernia, commencing at the internal ring, finally becomes direct by the gradual dilation of the orifice.

The superabundance of ventro-inginal hernia, proves that the ventro-inginal truss is even a more important instrument than either of the others.



## CHAPTER X.

### ON DISEASES MISTAKEN FOR HERNIA.

IT is not uncommon for the patient to be deceived into the belief that he is labouring under a hernia, when affected with tumours about the groin, which have no connexion with the intestine; and the same mistake is sometimes made by surgeons. This fact has been already noticed in the chapter on the Symptoms of Hernia; but it is necessary to add some further remarks upon the subject, in order to prevent the application of trusses in cases that might be seriously injured by the pressure of instruments.

*Glandular Swellings.*—The absorbent glands are liable to frequent enlargement in consequence of direct irritation, or the absorption of deleterious substances from without. These swellings are often placed above the site of femoral hernia, and occasionally they occupy the position of the tumour in the common variety of inguinal hernia.

There is little danger of mistake between this condition of the parts and a true rupture, when the sac contains nothing but intestine; yet it is not always easy to distinguish between them when the hernia is omental.

In addition to what has been said on the subject in the chapter before alluded to, it may be proper to observe, that the form of the tumour assists, in no small degree, the deduction of a correct diagnosis.

In omental hernia, when the contents of the sac

are inflamed, the tumour, though somewhat hard, like that arising from the swelling of a gland, is generally less moveable, and conveys to the fingers the idea of originating at a fixed point, while that of a regular swelled gland does not. Even when an enlarged gland has adhesions of a firm character with the parts beneath, so as to render the tumour nearly immovable, the edges of the base of the enlargement are almost always well defined and sharp; while those of a rupture, under similar circumstances, are rounded and less firm. When it is remembered, that a herniary tumour in a high state of inflammation, is almost invariably attended with the well-marked symptoms of strangulation, which have been laid down in the chapter above referred to, it is evident that a skilful surgeon would very rarely mistake the case, and the like accident could not easily occur even to the patient.

But there is a species of voluntary deception frequently practised by young men of dissolute habits, by which they are likely to injure their own constitutions and compromise the character of an inexperienced practitioner. No one who has been at all familiar with such practice, can have avoided embarrassment from the solemn asseverations of those whose follies or crimes have laid them open to serious disease, yet whose respect for the ordinations of society, or their personal interests induce them to conceal the penalty inflicted upon them, even from their medical adviser ! To such I can only observe, that in the minds of experienced men, the artifice cannot effect the desired result; and in those of the inexperienced, it ensures its own punishment to an

extent quite sufficient to answer the ends of natural justice!

Those who are most subject to glandular swellings that might be mistaken for hernia, are the Africans, and women of a scrofulous constitution; but a due attention to the mobility of the tumour, the form of its base, and the history of its development, will render it difficult to mistake the nature of the case.

*Cirsocele and Varicocele*—terms that are frequently used as synonymous—are applied to diseased conditions of the spermatic cord, so similar to each other that no very clear distinction has been drawn between them. The latter term is more familiar to general readers, and it will therefore be exclusively employed in the following remarks.

Varicocele is an enlargement of the veins of the spermatic cord, seen most commonly on the left side, and frequently occasioning extensive tumours precisely in the same situation with inguinal hernia, after the bowel has descended into the scrotum. There is little difficulty in deciding between this affection and a true hernia, when proper care is exercised in the examination; but it is not at all unusual for practitioners who are not familiar with surgery, to direct the application of trusses in cases of varicocele where no hernia exists. I have been consulted by not less than a dozen patients who have had instruments of this kind applied by medical men under such circumstances, from a mistaken opinion that rupture had taken place, and sometimes from the still more erroneous idea that varicocele itself may be benefited by a truss. The means by which a correct diagnosis may be formed, will be pointed out directly, but as to the latter supposition, it

does not deserve a comment. It is not uncommon to see varicocele *caused by a truss*, but that it should be *cured by one*, is inexplicable upon any sound pathological principle, and it must be supposed that those who have reported such cases, have mistaken either their nature or result!

A varicocele being composed of enlarged veins like those frequently seen in the lower extremities in tall men who are subject to ulcers of the leg, presents to the fingers on examination, the sensation of a bundle of worms, twisted upon each other, and is very different in this respect from the more uniform swelling of a real hernia. In varicocele, it is generally easy to detect the outline of the external abdominal ring, which is almost always impossible in inguinal hernia. If the blood be gently pushed back by the fingers in a varicocele, it gradually accumulates again in spite of any reasonable degree of pressure exercised on the external ring; but in inguinal hernia, on the contrary, such pressure effectually prevents the re-appearance of the tumour. In cases of very great enlargement of the vessels, this test may prove somewhat unsafe.\*

It is particularly necessary to guard the patient against one frequent source of error in the diagnosis. When a patient with rupture is directed to cough, the propulsion communicated to the fingers of the surgeon is considered as a distinctive mark of the disease, but a similar sensation is perceived in varicocele from the re-

\* In the case of a young gentleman labouring under varicocele recently under the care of Dr. R. COATES, the reduction of the blood contained in the tumour was followed by symptoms so alarming that this surgeon considered the patient in imminent danger of death for more than an hour. There were repeated attacks of profound syncope, and occasional slight convulsions, which Dr. COATES attributed to the action of coagula or hyper-carbonated blood on the heart and nervous system!

gurgitation of the blood in the spermatic cord. An experienced practitioner may distinguish between these two forms of propulsion, but to the beginner, it is not always an easy task.

The form of the tumour also furnishes means of distinguishing these two affections. In varicocele the principal bulk of the swelling is found at the lower extremity of the scrotum, and generally diminishes pretty uniformly as it approaches the abdominal canal—the testicle being easily felt on the front and lower part of the tumour. In hernia, on the contrary, if the intestine descend low enough to produce any doubt on the question, the testicle is almost always observed behind the tumour, which generally enlarges suddenly, immediately outside of the external ring. If pressure be made over the external ring in hernia, no change in the tumour is perceived, but if the same test be applied in varicocele, it is rendered harder and larger by the accumulating blood.

The causes of varicocele are the same with those which produce varicose veins in other parts of the body, and most of these are well known to act by retarding the return of blood towards the heart. It would be difficult to contrive a better mode of producing this effect than the application of a truss, provided the instrument be placed in such a manner as to act on the disease at all.

In varicose veins it has been long customary to attempt a cure by tying or dividing *some of the principal trunks*, by which means the route of circulation is changed, and the diseased vessels are allowed to retract: but in varicocele, we cannot change the route of circulation effectively, without arresting it completely, or so



nearly as to secure the destruction of the functions of the testicle.

The pad or block must compress the cord against the body of the pubis until the return of the blood through the veins, and its flow through the spermatic artery be prevented. In this state of things, the minute vessels of the tunica vaginalis may continue to support the vitality of the organ, but its functions must necessarily cease! If, then, the cord could endure the terrible effects of such a pressure, the result would be any thing but a happy or warrantable one. I have seen the testicle destroyed by the misapplication of trusses, and I have frequently met with cases of varicocele caused by the employment of ill-regulated instruments. If a mechanical apparatus should cure a varicocele, it cannot be a truss—if the apparatus be a truss, it cannot cure varicocele!

*Hydrocele*—or dropsy of the tunica vaginalis, is a disease which it is sometimes difficult to distinguish from an irreducible hernia, but it should never be confounded with a rupture that is reducible. It forms no part of the subject of this treatise to point out the diagnostic marks of hydrocele; but the possibility of injury from careless or hasty decision, renders it proper to mention a singular illustration of the liability of skilful men to commit dangerous errors in surgical practice, when possessed of too much self-confidence.

*January, 1836.* H—S—, an English gentleman now resident in Philadelphia, has been subject to ventro-inguinal hernia of the left side, for ten years. The accident occurred in fox-hunting.

This patient consulted DR. HARTSHORNE, who re-

ferred him to me. The hernia was easily reduced, and was perfectly retained by the ventro-inguinal truss. He had never worn any instrument previously to this application. *The tumour always retired at night, and re-appeared during the day.* About five years ago he consulted a Danish naval surgeon, then on the West-India station, and the case was pronounced hydrocele. Two different hours were appointed on different days, for the operation of tapping and stimulating injections; but fortunately the fears of the patient in both instances prevented the execution of the design! No attempt at reduction had been made by the surgeon, as there was not even a suspicion of hernia in the case; and the diagnosis was thought to be so perfectly plain, that great offence was taken at the unwillingness of the patient to submit to advice! The reading of a medical work at length convinced the gentleman that he laboured under hernia, which induced him to apply to DR. HARTSHORNE.

*Hydrocele of the Spermatic Cord*—is a disease rare in adults, but children are more frequently affected with it.

When a swelling of this kind occurs very near the external ring, it may be mistaken for hernia; but the impossibility of the reduction, the absence of the symptoms of strangulation, and the great transparency of the tumour, which is almost an invariable indication of this variety of hydrocele, are quite sufficient to distinguish it from a rupture.

## CHAPTER XI.

### ON HEREDITARY HERNIA.

IN the course of the investigations connected with the question of the radical cure of hernia, a considerable number of facts have been accumulated, which illustrate another very curious circumstance in the history of the disease.

It has been thought extremely singular that ruptures should be so frequently occasioned by very slight accidents in some persons, while in others, more considerable force, acting under similar circumstances, is productive of no injury.

The idea of a congenital weakness of certain portions of the abdominal parietes has been started in order to explain this circumstance; and the following notes not only strengthen this supposition, but show that this weakness, or peculiar liability to hernia, is transmitted in families by hereditary predisposition. This subject is interesting in several points of view, and is not without practical importance. It will receive particular attention in the future examination of cases.

EXAMPLE I.—*Note of the family of — — —, Esq., County of Philadelphia.*

The members of this family consist of the parents and five children. The parents have never been affected with hernia;—their eldest child is now twelve years old.

Two of these children labour at present under her-

nia, the eldest having been already cured. The second is now wearing an instrument for inguinal hernia complicated with umbilical rupture.

The third child is also ruptured, but the instrument has not been applied as yet.

EXAMPLE 2.—The family of Mr. —, of this city, appear to be predisposed to this disease. It consists of the parents and two children.

Mr. — had an inguinal rupture, which has been cured. Mrs. — laboured under an umbilical hernia, which is still under treatment. And one of the children had a ventro-ingual hernia, which has been cured.

EXAMPLE 3.—The family of Mr. — consists of the father and four sons. Mr. — now labours under a double ventro-ingual rupture, and three of the sons are affected with hernia.

EXAMPLE 4.—The family of Mr. — appear to be peculiarly liable to the disease, for it has shown itself in three generations.

Mr. —, himself, aged 79 years, has a double inguinal hernia. He has four children, all of whom are ruptured. The first, aged 50, has laboured under the disease for 8 years: the second, aged 45, for 6 years: the third, aged 37, for 14 years: the fourth, a twin-brother of the last, has double hernia, one accident being of 4 years, and the other of 3 years standing. Besides these, there is a grandson, the child of the eldest son, who also suffers with hernia.

EXAMPLE 5.—The family of Mr. — consists of three sons, the parents being deceased. Of the sons, the eldest has laboured for 10 years under an inguinal rupture of the right side, occasioned by lifting: the

second has had ventro-inginal rupture of the right side for 2 years, the accident having been caused in the same manner: and the third is affected with ventro-inginal hernia of 9 months standing, from some unknown cause.

The following extract is from a paper by DR. CRITTENDEN of Ohio, now engaged in practice with my instruments in that state. Having called his attention to this interesting inquiry, it appears that he met with numerous cases of the same character.

“Many cases, (i. e. of Hernia,) as every surgeon knows, are to be traced directly to blows, strains, &c.; but there are also numerous cases in which it seems to have occurred spontaneously. In these cases I have almost always found, upon inquiry, that one or more of the patient’s family had been, or were at present, affected in the same manner. One of my patients informs me that his uncle, and the son of this uncle, besides some others of his connexions, are ruptured. Another, that his father and son, with himself, are affected. Another, who is ruptured on both sides, says his brother is in the same situation; and that his father and four of his brothers were ruptured in their old age without any apparent cause.”—*Ohio Medical Repository*, Vol. I., p. 79.

Many other cases of a similar character might be cited, but I have selected only a few of the strongest.

IN CONCLUSION, the Author begs leave to assure his readers that he has endeavoured to treat the subjects touched upon in this essay, in a spirit of perfect candour. He has been governed by no light or sinister motive in endeavouring to convince the patient that if an instrument be so constructed as permanently to retain, and ultimately to cure the formidable disease which has



been under consideration, it must require the aid of a well-qualified surgeon in selecting, applying, and regulating it.

To his professional brethren, and particularly those of this city, he tenders his warmest thanks for the candid and generous manner in which they have fostered and aided him in his endeavours to bring his apparatus into notice. They have proved themselves truly members of a liberal profession, and it is very improbable that more encouragement and less opposition would have been encountered by a novelty of important pretensions among any other portion of the community equally extensive.

It is the express object of the inventor, to place and to confine the use of his instruments strictly in the hands of medical men, and while all legal and necessary measures will be employed to prevent them from falling into the hands of the ignorant and of machinists, care will be taken to avoid all interference with the rights of the profession, and to extend as fast and as far as possible, the supply and the usefulness of the apparatus.



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